"Tribune-Way"

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Poultry House PLANS

"Tribune-Way"

POULTRY HOUSE PLANS

WITH BLUE PRINTS AND MATERIAL SPECIFICATIONS

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From Barrels to Skyscrapers

A Feeding Discovery Made Our Modern Poultry Houses Possible

VERY likely an over-turned barrel or the small A-type shelter for a hen and chicks were among the earliest specialized poultry shelters.

Although some rather elaborate, highly ornamented poultry houses evidently were in use on large estates and specialized poultry farms in the middle of the nineteenth century, very little attention was paid to the poultry house on the average farm. Such "good" houses as were built were made tight, and glass was used generously in the front, in order to get as much heat as possible from the sun shining through the glass.

Insulation Tried Frequently

The insulation of houses to make them warmer was tried frequently. It usually was accomplished by having a double wall with a dead air space between, and by covering the outside sheathing with a high grade building paper or roofing. Sometimes, sawdust was packed between the walls. It is reported that one poultryman went so far as to make his walls with three thicknesses of boards, three of paper, and two dead air spaces! Around 1900, straw lofts grew in favor as a means of keeping the house warm, and giving reasonable ventilation.

Then about 1885, what was known as the scratching shed type of house became popular. It was given its greatest publicity by A. F. Hunter, who was then editor of *Farm Poultry*. As its name implies, this type of house was one divided into two rooms, one of which had an open front on the order of a simple shed and in which the birds spent most of the day, while the other room was used as a roosting compartment and for laying.

Dispensing with the tight roosting room and leaving the scratching shed much as it was, made the open front house a natural development from the scratching shed type, and so the open front became popular about the close of the nineteenth century and during the early years of the twentieth century.

Narrow houses were recommended because of the belief that sunshine should reach all parts of the floor.

Dirt or gravel floors were used almost exclusively, although wood floors were recommended for use when the soil on which the house was built was of a type which drained poorly. Early in the twentieth century, concrete was used occasionally for poultry house floors, while at the present time, of course, concrete is used almost exclusively for the first floor of poultry houses.

One of the reasons why there was such a great variety of ideas and theories regarding poultry houses was that no definite information was available from colleges or other sources.

One of the earliest bulletins reporting on an experiment on poultry housing was one published by the West Virginia Agricultural Experiment Station in December, 1900, in which a report was given comparing a warmly built house (without artificial heat) and an open front house. This experiment showed a gain of about $22 per 100 hens when kept in a warm house for a five-month winter period.

Experiments on the use of artificial heat were conducted at the Ontario Agricultural College, Guelph, Ont., and at the Maine Agricultural Experiment Station early in the twentieth century. Neither of them secured enough better results in the heated houses to warrant the cost of heating. Their results were about the same as those previously reported by poultrymen who had tried it.

But in 1924, a discovery was announced by Professor J. G. Halpin and his co-workers at the University of Wisconsin, which eventually explained a good many housing problems, as well as a great many of the other questions which had perplexed poultry raisers.

This was the announcement of the part vitamin D plays in poultry nutrition. Looking back now, it is easy to see that the poor results from hens kept confined during the winter were due largely to a lack of vitamin D, rather than to the house, and that those hens which were in open front houses or which ran outside secured more sunshine which resulted in better health, higher egg production, and higher hatchability.

Modern Buildings Evolved

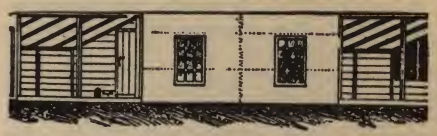
This discovery in feeding, along with those which have come later as a resul of this beginning, have made it possible to go back to the tight poultry houses which were in favor 50 or more years ago, but now, instead of building the walls three layers thick, a single layer of insulation is used in the walls and ceiling. In insulating value, this usually equals two thicknesses of boards with building paper between, thus giving the same protection at much less cost and less labor. Tough sisal or other building paper keeps out wind and moisture.

Now, instead of limiting the width of the houses to 12 or 15 feet so the sun can strike the whole floor, we seldom have houses less than 20 feet wide and many of them reach widths of 30 and 40 feet or even wider.

Now, instead of building houses only one story high so the chickens can get out on the ground, we have them two, three, four, five, seven and even more stories high, with no intention of ever letting them out on the ground.

In other words, we now accomplish the things which poultrymen wanted to accomplish 50 years ago, but couldn't. Manufacturers have played a vital part by keeping in touch with poultrymen's needs, and meeting them with modern equipment. Modern insulation, sisal paper, ventilating and heating equipment, open feeders, automatic waterers, windows which are easily installed and regulated, all have come into wide use by poultrymen almost within the last decade. Glass substitutes and window glass which transmit the ultra violet rays of sunlight have enabled poultrymen to make use of the available sunlight.

This never would have become possible without Halpin's discovery in feeding. That made it possible to replace the vital sunshine with vitamin carriers. So, strangely enough, it was a discovery in feeding which made our modern poultry houses possible. Without that discovery we still would be forced to use the narrow, open front type of house.



Early New England laying house of the scratching shed type, which was popular about 1885. There was a curtained front on the shed to protect the birds against inclement weather.

A modern poultry house of late design. Besides being well-insulated, it has a modern ventilation system. Such a house will accommodate comfortably 200 to 250 hens.

After the discovery in feeding that sunshine substitutes would enable the birds to lay through the winter as well as the summer without outdoor yards, many poultrymen remodeled old buildings, especially dairy barns, to house hens on several floors.

Any requests for additional information regarding any of the plans shown in this book, and orders for additional copies of the book, should be sent directly to Service Department, Poultry Tribune, Mount Morris, Illinois.

New Developments

A Summary of the Latest Ideas in Poultry Housing

POULTRY housing recommendations, like other poultry practices, change from time to time. The multiple story poultry house is still a relatively new development as far as many parts of this country are concerned. New suggestions for the interior arrangement of the poultry house have also been made during the last few years. A summary of the most important housing developments is included in this outline on housing problems.

A modern, three-story laying house arranged so that one man can take care of the 3,500 birds it houses. Multi-story poultry houses are popular, because they reduce the housing cost per bird, and at the same time make it easier to care for a large number of birds.

Multiple Story Houses Have Many Advantages:

1. The greatest advantages of multiple story houses are that they reduce housing costs per bird by 20 percent or more, depending upon the dimensions and the number of stories.

A good poultry house deserves a good roof. High-grade roofing material should be applied carefully under proper temperature conditions. A high-grade roofing material requires less frequent attention.

2. Reduce insulation cost as ceiling insulation is not necessary on lower stories.
3. Because of compactness are more convenient and, in this way, save time and labor and make operation more enjoyable, especially in winter.
4. Reduce cost of piping and wiring and make possible more economical use of running water and electricity.
5. Distribution of feed and litter and removal of droppings is done more quickly and easily.
6. Make possible greater housing capacity on a small area of ground.
7. Simplify ventilation problems.
8. Make possible more uniform temperatures both in summer and winter.
9. Barns or other large buildings can be easily and cheaply converted into effective mutiple story houses.

Droppings Pits Have Advantages for Both Hot and Cold Weather Conditions:

1. Less labor because they require less frequent cleaning.
2. More economical because they require less floor area to be covered with litter.
. Less droppings in litter because inactive hens will find seclusion on roosts that are low instead of squatting on the floor—too, this may tend to lessen feather picking and cannibalism.

For both laying houses and range shelters, metal roofing is gaining favor. This material is relatively easy to apply, and may be counted on to give many years of service.

. Reduces liability of injuries due to jumping from roosts. Some say low roosts lessen the number of blood spots in eggs.
5. Better ventilation and air conditions, especially better than in houses where there is no opening between the droppings board and the rear wall.
6. Even though pits do occupy approximately one-fourth of the floor area, they do not reduce capacity because with greater daytime use of the roosts there is less congestion on the floor and more freedom for active birds to eat and drink.
7. Droppings dry quickly during fly time so they are not a fly attraction.
8. Droppings dry as they accumulate, so with same amount of ventilation there may be less odor than with droppings boards.
9. Wood floor can be used in a pit if a 2 to 3 inch covering of some litter is used next to the floor to prevent droppings from coming in contact with the floor.
10. If the house is 24 ft. wide or less, it is preferable to have the pits next to the rear wall, but if the house is wider than 24 feet, it is usually advisable to have the pit in the center of the floor. A room 30 x 40 ft. might have a 14 x 20 ft. pit placed in the center from front to rear and 3 ft. from one end of the room. In this case, the room could be divided into two pens by means of a wire netting partition through the center of the room with a wire netting door 3 ft. wide at each end. One watering trough could serve both pens. Other arrangements could be made to suit different conditions.

Wider Houses:

Wider poultry houses, up to 40 ft.,

A modern poultry house almost completed. This two-story, 20 by 40 ft. building has a 20 by 20 ft. basement egg room under one end, with two additional floors available for battery brooding and laying stock.

are more economical to construct, point out D. C. Kennard and V. D. Chamberlin of the Ohio Agricultural Experiment Station. The more nearly square up to 40 ft. the poultry house is, the more economical it is to build because less wall area is required. A popular width is 30 feet.

Window Space:

The former recommendation of 1 sq. ft. of window space for each 10 to 15 sq. ft. of floor space is too much, as excessive window space offsets insulation, claim Kennard and Chamberlin. They recommend 1 sq. ft. of window space for each 25 to 50 square feet of floor space, depending upon the type and construction of the house.

Painting Roofs:

Low, flat roofs covered with black or dark-colored roofing material invite the absorption of the summer heat rays and endanger the health of the birds housed. Painting poultry house roofs with ordinary white paint, aluminum paint, or a special roofing paint now on the market, will deflect the heat rays of the summer sun instead of absorbing them and, incidentally, will preserve the roofing material as well.

Metal Roofing:

Due to the fact that it is more leak proof, durable, longer lived and less expensive to maintain, good quality galvanized roofing material has become very popular. The old idea that houses with metal roofs are hot in summer and cold in winter has been largely disproven. Metal roofs for brooder houses and laying houses, when properly insulated, make most satisfactory roofs. Because of the light color, galvanized metal roofs reflect much of the heat rays of the summer sun that are absorbed by dark-colored materials. Galvanized metal roofing is very satisfactory for use on summer range shelters for growing pullets and can be used without insulation.

Standing seam (V-crimp) galvanized roofing is generally used in preference to corrugated roofing for moderate or low pitched roofs and is especially adapted for use over roll or built up roofing on shed roofs.

Basement Houses:

Now that it is recognized that a certain degree of humidity is desirable, that dusty litter is more hazardous to layers than damp litter, and that dampness has been held responsible for many troubles with layers which were due to other causes, basement quarters for poultry are becoming more commonly used. When properly ventilated, basement quarters provide a most satisfactory environment for poultry.

Window Screens:

Fly screen on poultry house windows prevents tapeworms by excluding flies, improves ventilation without drafts, provides protection from driving rain and snow, and does not exclude the benefical rays of the sun.

House Facing East:

Many of the newer poultry houses are built facing east instead of south as is customary, because during 10 months of the year direct sunlight can enter the east front and penetrate to practically the entire interior. With a south front, direct sunlight can enter only during the winter months and even then, health giving properties from the sun are less potent and windows are closed a great deal of the time. Generally, east fronts are less exposed to winds, rain, and snow. After seven years experience at the Ohio Experiment Station, an east front house is preferred.

Steel Adds to Permanence Of Poultry Farm Improvements

In poultry raising, as in any other business, overhead cost, including depreciation, repair and upkeep, adds to the cost of production. Land, including fencing and buildings, usually make up about 70 percent of the investment in the poultry business. With this in mind, the poultry raiser will do well to invest every dollar with the purpose of securing improvements with long life and low upkeep.

Sheet steel roofing for poultry buildings makes a permanent, long-lited roof, on

For a great many years farmers have used sheet steel to roof and side important farm buildings. During the past few years, laying houses and brooder houses also have been included. And, of course, everyone knows how welcome poultry netting is, particularly during the brooding season. (Photos from Poultry Tribune Farm)

which very little repairing will be necessary for many years. The same material can be used for covering old side walls or side walls on new buildings. It is easily applied and makes a fine looking job.

Segregation of birds of different ages and perhaps breeds, is necessary from a sanitation and management standpoint, wherever poultry is raised. At times, fences need be only temporary, and can be easily installed by using steel posts and light weight fencing. For permanent fences, of course, heavy gauge fencing and steel posts are desirable and are cheapest in the long run.

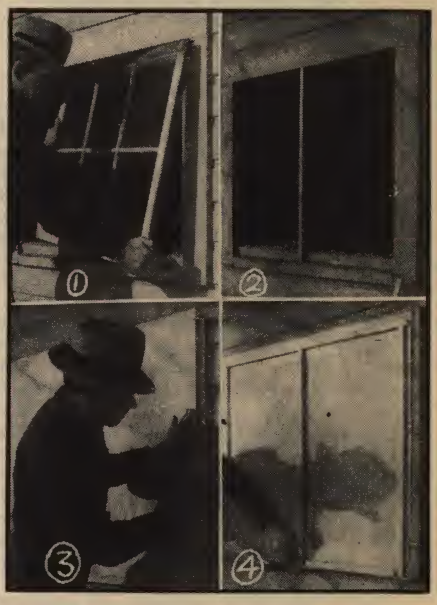
Floor Construction to Prevent Moisture Is Aim of Engineers

In the construction of farm buildings where concrete floors are desirable, the Farm Structures Division of the American Society of Agricultural Engineers, St. Joseph, Mich., advocates laying the concrete slab floors directly on solid earth, rather than the frequently used bed of cinders, gravel or crushed rock, and also advocates the use of a one inch strip of insulating fibre board expansion joint along the foundation walls, separating the floor slab from the walls.

Their experience shows that condensation, the source of most dampness, is much less likely to occur when the concrete rests directly upon the warm earth than when floor and earth are separated by these other materials. The fibre board expansion joint insulates the floor from the foundation walls, and allows for contraction and expansion.

This use of insulation board as expansion joint material is not a new one. Especially treated cane fibre board has been standard for this purpose in many types of concrete construction for some years. The resiliency of the material keeps the joint tight and the asphalt saturant makes it waterproof.

Extend Use of Glass Substitute By Installing It Correctly



Many poultry raisers are putting glass substitute in their brooder house windows this spring to get the benefits of ultra violet rays of sunlight. Life of the glass substitute material can be extended considerably by installing it correctly, as shown above.

(1) Since this window was not needed for ventilation, the entire sash was removed, and the glass substitute applied to the casing. On windows which are to be opened, the glass substitute can be applied directly to the sash. (2) Glass substitutes will last longer if they are supported at least every 18 inches. This required an extra support in the center of this window opening. (3) Glass substitute material should be stretched as tightly as possible and tacked in position. Do not trim it even with the cleat. It is important to allow at least an inch or more of extra material along each edge. Trimming may be done with shears or a sharp knife and straight edge, as in this picture. (4) Cleats should be nailed tightly all around edge of material, and vertically every 18 inches. Allow some opening along the bottom cleat for quick drainage. Tight nailing helps to keep the material tight and prevents pressure of the material against the nails. Note the extra material outside of the cleats. At least one inch should be allowed to extend beyond the cleats, as there is always some shrinkage due to temperature changes.

How to Ventilate

Have Adequate Insulation Plus Controlled Air Movement

This modern laying house has a large cupola to let out summer heat. In the winter, the shafts leading to the cupola can be closed partially to restrict the movement of air.

COMFORT is essential for best production results with all animals. Most will agree upon the following as constituting important elements in comfort. Freedom from sudden and gross changes in temperature, air movement and humidity; in other words, surroundings in which extremes are absent and which approximate springtime outdoor conditions.

Both the winter and summer seasons produce the extremes against which the poultryman must house his birds. In addition to providing tight roof, walls and floor, the two important things which the poultryman can provide are *adequate insulation* and *controlled air movement*,—proper ventilation, to assure maximum comfort for his birds. These, in turn, should produce maximum results, provided, of course, the birds have been raised properly and are bred and fed for production.

There are two methods of housing birds. The first method is the cold house method with birds protected only from excessive wind movement. Where there is good air drainage, tight, deep pens all open in front, will produce good results.

The second method is the warm house method. With this, the houses should be insulated and may be used in almost any location, damp or dry, although a dry one is always to be preferred. *Adequately insulated and properly ventilated, such houses prevent slumps in production due to extreme weather, including summer heat or winter cold; reduce feed consumption; alleviate respiratory epidemics; prevent water from freezing and litter from dampening; increase fertility and perhaps hatchability; and probably reduce mortality.* These houses do for hens what comfortable stables do for cows.

It is quite apparent that a major factor in promoting comfort is insulation. Insulation prevents animal heat, radiating from the hen's bodies, from being conducted through the roof or walls, and in turn from being radiated into the cold out-of-doors. This makes the hens feel warm. This is all important, for even though much ventilation should be employed and therefore the air temperature should remain relatively low, insulated interiors, especially around the roosting quarters, conserve much bodily energy and make the hens feel comfortable. This is probably the most important benefit from the use of insulation.

When the poultryman attempts to keep the non-insulated house warm, by shutting up the houses too much, he will, of course, raise the temperature more or less depending largely upon the size of the building. He will also cause the dew point to be reached on the interior walls, ceilings and possibly the floor. This causes the interior moisture to be condensed upon these surfaces in the form of frost or small droplets of water as on the outside of a glass of ice water in summer. An accumulation of this in cold weather eventually produces a very damp interior, including the litter, and may produce the raw, damp feeling so uncomfortable to poultryman and hens. Adequate insulation will prevent this condensation.

The insulation in retaining the animal heat raises the interior temperature which greatly increases the water-carrying capacity of the circulating air, about 60 to 70 percent for each 10 degrees rise in air temperature in winter. If, in turn, this dryer air is recirculated over the litter, the droppings have their water absorbed into the air and taken out of the house. This makes for dry litter as well as a comfortable floor down where the birds live during the day. This retention of heat, in making a greater difference between interior and exterior temperatures, makes the ventilation that much more positive, for when no wind is blowing the only natural force making for the ventilation of a building is the difference in weight between the light, warm interior air and the relatively heavy, cold exterior air. The greater the difference, the more rapid the circulation.

Furthermore, the same insulation which is of such real benefit in the winter is also valuable in the summer. The heat which was retained inside of the house in winter is now detained outside of the house in the summer.

There are several methods of applying insulation, some of which will be discussed and illustrated.

Figure 1 shows a simple and inexpensive method of insulation using a water and wind-proof building paper which comes reinforced with non-tearable fibers. This is rat proof because no space is provided big enough back of the paper in which to live. Furthermore, the one-half inch dead air space provides good insulation, because it is

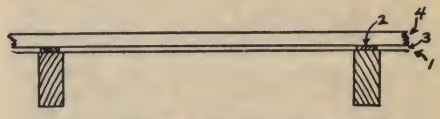


Fig. 1—Insulation with non-tearable paper (new building) (rat proof). 1. Water-proof building paper. 2. Furring strip-lath. 3. Dead-air space. 4. Siding (roof boards).

not wide enough to permit any heat circulation. Of course, the paper itself has very little insulating value but does make a draftproof wall, another very important comfort factor.

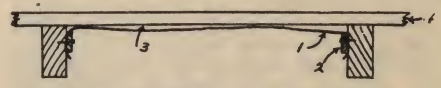


Fig. 2—Insulation with non-tearable paper (old building) (rat proof). 1. Water-proof building paper. 2. Fastening strip-lath. 3. Dead-air space. 4. Siding (roof boards).

Figure 2 shows how this same paper may be used in a house already built. The fastening strips nailed to studs or rafters are placed so as to leave a space about one-half inch in width between the paper and the boarding.

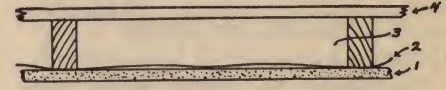


Fig. 3—Insulation board on inside of studs (rat haven). 1. One-inch insulation board. 2. Building paper, north wall and side walls near roosts. 3. Circulating air space. 4. Siding (roof boards).

Figure 3 shows how one-inch insulation board frequently is used, nailed to the inside of the studs or rafters. It makes too good a home for rats unless carefully protected and the large air space is a circulating one, not a dead air one, and therefore not so good for

insulation value. It must be protected from the hens, too.

Figure 4 shows the better way of using this insulation board, enhancing the value of the air space and making it rat

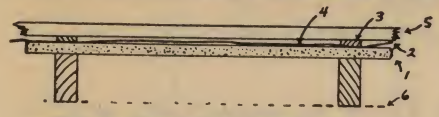


Fig. 4—Insulation board on outside of studs (new building) (rat proof). 1. One-inch insulation board. 2. Building paper, north wall and side walls near roost. 3. Furring strip-lath. 4. Dead-air space. 5. Siding (roof boards). 6. One foot of hen netting near floor.

proof. A strip of hen netting one foot wide nailed to the studs going to within 4 inches of the floor to make it self-cleaning of litter protects the paper from the hens' pecking.

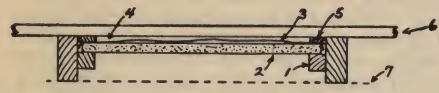


Fig. 5—Insulation on furring strips (old building) (rat proof). 1. Fastening strip, 1½ x 1½ inches. 2. One-inch insulation board. 3. Building paper, north wall and side walls near roosts. 4. Dead-air space. 5. Furring strip. 6. Siding (roof boards). 7. One foot of hen netting near floor.

Figure 5 shows a method of applying this to a hen house already built. The board is cut about one inch narrower than the space between the timbers to allow for the warping of studs and rafters.

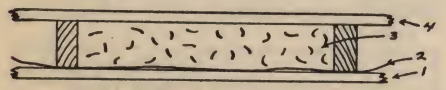


Fig. 6—Shavings fill insulation. 1. Sheathing. 2. Building paper. 3. Shavings. 4. Outside boarding. Note: Paper should be on the inside of studs in this case to prevent inside moisture from working into shavings and later condensing.

Figure 6 shows a shavings fill providing the greatest amount of insulation. This also provides a home for the rats. Using rock wool for the first foot and for 6 or 8 inches above the level of the droppings boards, or any other place such as nests where a rat can stand and gnaw through, will make this method of insulation practically rat proof.

False ceilings and straw lofts are common methods of insulating the upper portion of a building. They are a great benefit in making a house more comfortable. Unless great care is used, however, they make attractive rat havens, particularly, in the case of straw. It is also to be kept in mind that the benefit from these is not due to cutting down the volume of air inside, except as that may be associated with a reduced area of cold surfaces upon which moisture may condense or through which heat may be lost. It benefits much as does a vestibule or a storm window, neither of which reduces the volume of the dwelling upon which they are placed.

It was stated above that insulation increased the inside temperature and prevented condensation. This greatly aids ventilation, making it possible to provide much smaller ventilation openings to do the same job, which, in turn, aids in building up a still higher temperature. In fact, one poultryman has said, "Insulate thoroughly, and I don't care what the system of ventilation may be." Another has said, "Put in heat and I'll have dry litter anyway." But both were wrong. The writer has seen well insulated, well heated houses that were damp, and in each of these instances the birds in them were not doing well. It is evident, therefore, that the ventilation also must be right.

No attempts will be made to discuss different systems of ventilation. Suffice it to say that probably many mistakes have been made in carrying over bodily into poultry houses systems that have been successful in dairy stables, particularly systems employing exhaust flues extending down close to the floor. With eight times as much space per pound of animal in the hen house as in a stable, there is not enough heat to cause adequate movement up such flues, especially in foggy windless weather.

Only the method of ventilation recommended by the Massachusetts State College will be discussed. Warm air rising will always flow out of an opening placed high in the pen. Positive circulation is guaranteed in any kind of weather by this placement of opening.

Fig. 7—Restricted-front ventilation—winter adjustment—causing re-circulation of warm air.

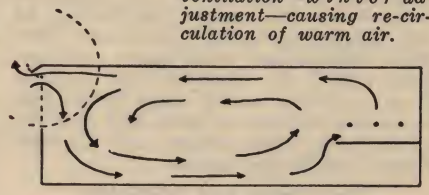


Figure 7 shows what the interior circulation is when the ventilation is restricted to the upper portion of the central windows and to the middle slot. The incoming air is so close to the outgoing air that air friction pulls down some of this warm air and recirculates it. The figure also shows the roosts at or near the back wall, *directly opposite the front openings*, an essential arrangement for correct recirculation.

Fig. 8—Open-front ventilation—summer adjustment—causing displacement of warm air.

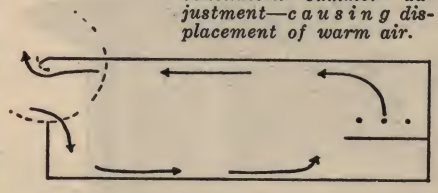


Figure 8 shows the summer or displacement circulation with the front windows open.

This is the adjustment for winter in the cold-house (open-front) method of ventilation. Its success, in winter, depends upon two factors. First, the house must be kept open,—not closed on every warm stormy spell. Second, the location should be where there is good air drainage. An abundance of damp air circulating through a house will not dry it out.

Figure 9 shows a misplaced exhaust flue for winter purposes which permits the warm air to sneak out without coming in contact with the incoming cold air, causing little or no recirculation. culation.

Figure 10 shows a correct placement

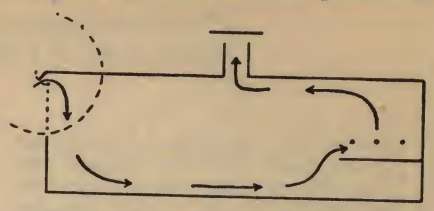
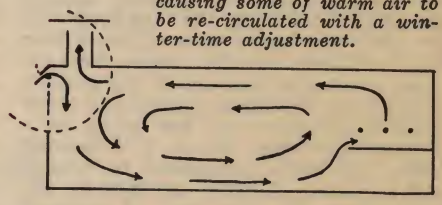


Fig. 9—Exhaust flue placed outside of the circle causing displacement circulation with a winter-time adjustment.

of the exhaust flue, close to the intake. Such flues should be necessary only in very deep houses or houses with low fronts. See Figure 10. It is considered that intake and exhaust should be "within the circle" shown in these figures. In windy weather, it is also considered essential to limit the ventilation

Fig. 10—Exhaust flue placed within the circle causing some of warm air to be re-circulated with a winter-time adjustment.



to the middle of the front of each pen to cause a horizontal recirculation of heat. A west wind entering an east window and carroming around like a billiard ball inside and coming out of a west window displaces the interior heat more than it recirculates it. Furthermore, each pen should be nearly square with a complete partition, if only of muslin, to make each pen a ventilation unit unaffected by wind, moisture and temperature of adjoining pens.

Finally, the ventilation should be limited to the openings provided by slots and the open spaces above vertically sliding windows and not be partially provided by that which would blow through muslin cloth. Muslin ventilates most when needed least—when the wind blows. Therefore, glass windows or non-ventilating glass substitutes are recommended.

An Insulated Egg Room

Where the basement of the home or a specially constructed egg cellar is not available for storing the eggs on the poultry farm, a special, insulated egg room of this type should be constructed. The walls are double-lined with insulation board. A modern refrigerating apparatus may be installed in this building to control the temperature.

10 x 12 Shed-Roof Brooder House

With the accompanying blue print and a bill of material any farmer-poultryman can easily build a 400 chick brooder house.—Round house very satisfactory too.

JUST as the incubator has proven to be more desirable, efficient and dependable than the setting hen, so has the modern oil or coal burning brooder come to do the brooding better and with a greater saving of labor.

"The success of all poultrymen depends upon raising strong, vigorous pullets," say poultry investigators at Ohio State University. "These can best be raised by moving the chicks each year to fresh ground where there is an abundance of green grass, insects and shade." Experienced poultrymen realize that intestinal parasites and diseases can be kept out of the flock at a less expense by moving the house, than by doctoring the sick birds.

Each year the warning of poultry veterinarians becomes stronger against brooding chicks on the same ground or near the same ground on which old hens have run for years. Because of an enormous increase in the poultry population, intestinal worms and other ground parasites are increasing at a tremendous rate and it is becoming more and more necessary to branch out to new soil. This can best be accomplished by the use of a good brooder house that is portable.

Clean Ground Needed

This range feature alone is worth a great deal to the poultry raiser, for when chicks are cared for in small numbers by a broody hen, it is almost impossible to move them far enough from the main farm buildings to insure their getting fresh ground. Too much labor is required also in caring for a large number of chicks when they are brooded in small lots in this manner.

On the other hand, when one unit of 300 chicks can be placed out on range in one location, and another unit of 300 chicks in another location with a coal and feed supply in each house, the work can be easily done, and the raising of healthier, stronger chicks insured.

Simple House Easy to Build

A shed roof brooder house designed by the poultrymen at Ohio State University seems to best fit the needs of farmers, and especially of *Poultry Tribune* readers. This brooder house has been designed to meet the demand for a portable house, large enough to brood 300 to 350 chicks at one time; small enough to be moved easily; and cheap enough to be within the means of any poultryman. "This house," they say, "is large enough to permit good ventilation and to allow the chicks room to get away from the brooder stove and into cool air."

While ventilation in this house is secured by the proper regulation of the window openings, there are several satisfactory ventilating systems that might be installed if desired. They probably would make it possible to secure a more definite and positive control over temperature and air conditions inside the house.

Round House Very Satisfactory

In an effort to overcome one objection to the square brooder house, namely the corners into which little chicks sometimes crowd when they are not rounded out with boards or paper, a number of manufacturers have attacked this problem, and have satisfactorily evolved the round brooder house.

There are also satisfactory six and eight-sided houses. These round, square, and many-sided houses are made of various materials—wood, metal, and insulating board. Each has its advantages and these ready-built houses offer bargains to poultrymen unable to build their own houses very economically.

Since sunshine is so important in the early life of the chick, every precaution should be taken to make sure that the growing chicks obtain as much as possible. Window glass screens out the helpful rays of the sunshine, hence experimenters have worked out substitutes for glass which are very cheap, admit the passage of the helpful ultra-violet rays and are easy to use.

The house will be more satisfactory for early brooding, and less heat will be needed at any season if it is lined with insulating material. If insulation board is used, it should be nailed to the outside of the studding and rafters before the siding and roof sheathing is applied. Cover it on the inside with lumber or insulation hard board to prevent the chicks from picking it.

The accompanying blue print and bill of material makes it relatively easy for anyone to build this economical, yet efficient, brooder house.

Bill of Material for Brooder House

Dimension Lumber

2 pieces, 4"x6", 14 ft. long, for runner
7 pieces, 2"x4", 10 ft. long, for joists
4 pieces, 2"x4", 12 ft. long, for joists
7 pieces, 2"x4", 7 ft. long, for front stud
6 pieces, 2"x4", 5 ft. long, for rear stud
5 pieces, 2"x4", 14 ft. long, for side stud
2 pieces, 2"x4", 10 ft. long, for plate
6 pieces, 2"x6", 14 ft. long, for rafter
145 feet B. M. 1"x6", flooring, 12 ft. length
200 feet B. M. 1"x8", shiplap roof sheathing
340 feet B. M. 1"x6", drop siding
2 pieces, 1"x2", 10 ft. long, muslin window frames
3 pieces 1"x4", 10 ft. long, window sill and casing
2 pieces ¾"x¾", 12 ft. long, quarter round
1 piece 1"x4", 16 ft., for corner boards
1 piece 1"x3", 16 ft., for corner boards
1 piece 1"x3", 12 ft., for corner boards
1 piece 1"x4", 12 ft., for corner boards
1 piece 1"x6", 14 ft., for door frame
2 pieces 1"x4", 16 ft., for verge board

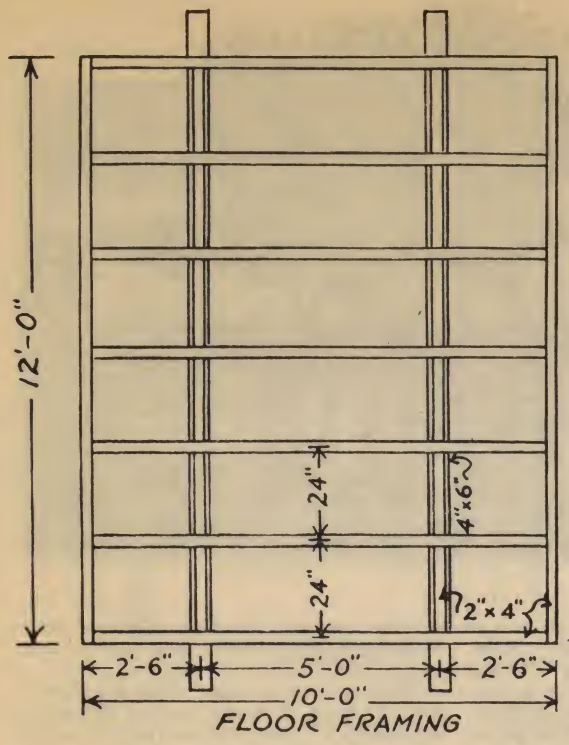
Hardware, Roofing, Sash, Etc.

1½ squares building paper for floor
2 rolls prepared roofing
6 4-light 10"x12" sash
18 linear ft., 1" mesh poultry netting, 30 inches wide
8 extra heavy strap hinges, 4"
2 extra heavy strap hinges, 6"
1 door latch
4 butt hinges, 3"
2 yds. muslin (or glass substitute)
10 lbs. 6d nails
5 lbs. 8d nails
5 lbs. 10d nails
2 lbs. 20d nails
¼ lb. poultry netting staple
16 window spring bolts

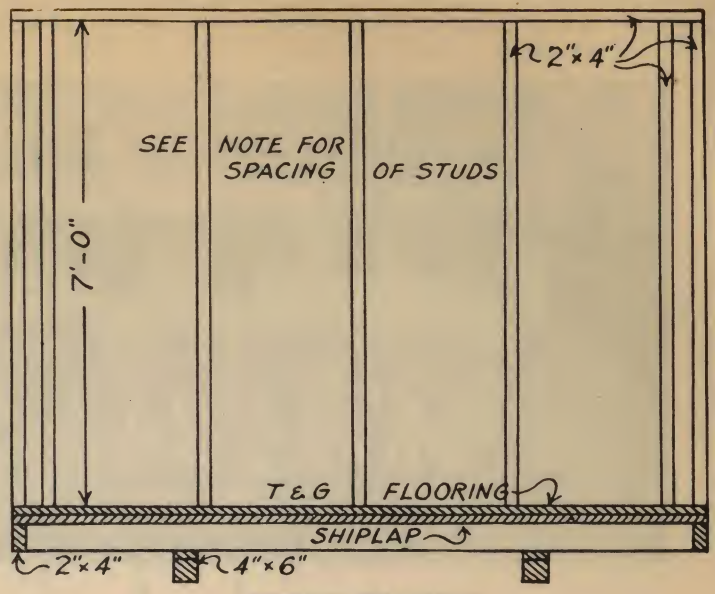
Alternate for Sheet Steel Roofing and Siding

Omit 2 rolls roofing; 340 bd. ft. drop siding; and 200 bd. ft. roof sheathing. Add 100 linear ft. 1" x 4" fence siding for open deck roof sheathing. 1.8 squares metal roofing, consisting of 6 pieces 8' length and 6 pieces 7' length.

Siding:
Front, 1 piece 8' length split
3 pieces 6' length cut
Rear, 6 pieces 6' length
Ends, each, 7 pieces 7' length
7 lbs. 2" screw drive, lead head, galvanized nails.



FLOOR FRAMING

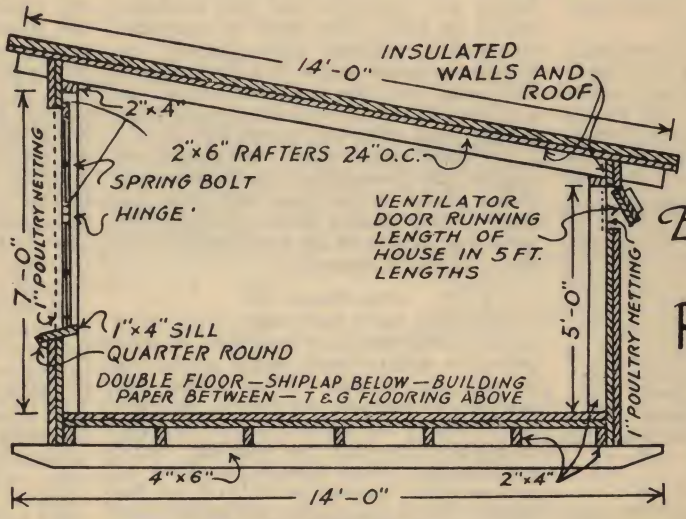


FRONT FRAMING

Note:~ Place a stud on center line of building and space remainder of studs both ways from center stud according to width of windows used

INSULATED SHED ROOF BROODER HOUSE

10' x 12'

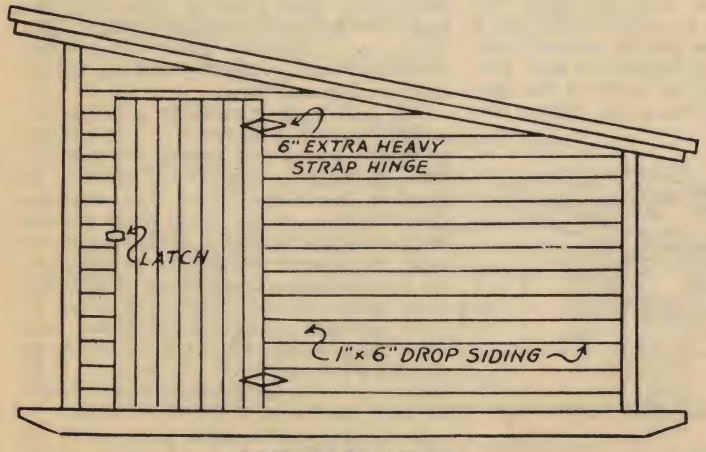


CROSS SECTION

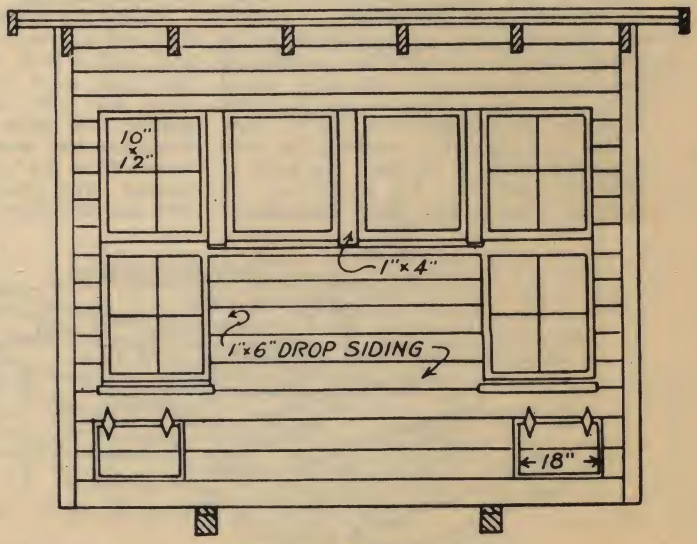
Especially Assembled for

POULTRY TRIBUNE

MOUNT MORRIS, ILL.



END ELEVATION



FRONT ELEVATION

A Model 24 *by* 24 Unit House

Perfected at Poultry Tribune Experimental Farm

WHEN it became apparent that the Poultry Tribune Experimental Farm needed a new house, the staff members decided on the Washington 24 by 24 type of house, only it was built in four units plus an eight-foot feed room on the east end. That made the house 104 feet long in all.

We tried to make improvements wherever possible. Now we are ready to pass on to *Poultry Tribune* readers the plan of the improved 24 by 24 Washington combination roof laying house. Some of these improvements are actually in use on the Poultry Tribune Experimental Farm buildings, others are recommendations as a result of what we have learned about the house.

First of all, let us tell you why we decided on the Washington combination roof laying house. We liked it because we figured it would be economical. Being a 24 by 24 unit originally, it is adapted to the most economical construction to get maximum floor space. The more nearly square a house is, the more floor space can be enclosed with a given length of walls.

24 Foot Depth Is Ideal

This 24 foot depth assured us that the birds would be far enough from the front to get ample protection during the winter nights, which in this Northern Illinois region get pretty severe at times. We also found that because of the depth of the house the birds would have an opportunity to range away from the window areas during the day.

We also liked the combination roof feature because it shortens the span of the roof, reducing the strain on the rafters. This is especially desirable in our climate where heavy snows are a frequent occurrence during the winter.

Mount Morris sits on top of the world, as it were, and our farm seems to top it all, hence it was no difficult problem for us to find a good location where air drainage and soil drainage would be good. Our farm is comparatively flat, sloping only slightly towards the west and a few feet toward the south; so the foundations of the poultry houses on the place are practically level with the ground.

For this combination roof house, we started the foundation about one inch above grade on the east end and that made it nine inches above grade on the west end, giving us an average of about three inches of gravel fill.

Have Gravel Fill

After the walls were built, we leveled off the inside territory and filled in with gravel to within three inches of the top of the foundation. Then after the gravel was tamped, we put in two layers of heavy tar roofing paper in order to make sure that no moisture could get through. The three-inch layer of concrete was poured on top of the tar paper. There are special moisture-proof building papers which also are excellent for this purpose.

Before the concrete was poured, however, we put wire ties across from the east to the west wall every four feet. This acts as a reinforcement for the floor, and helps to keep the walls together. The bolts to which these No. 9 wires are tied were put in the wall two inches from the top before the wall was poured. The concrete mixture for the wall and the floor was a one, three, five mixture except for the top half inch finishing layer, which was one to one and a half.

While we recommend that a concrete floor be used, it is not always essential, especially in some sections of the country where houses are set on posts off the ground. In such cases, ample provisions should be made to support the floors and walls properly.

It is very essential that all of the lumber used in the poultry house should be of good quality, as free from knots as possible, and as dry as possible. Lumber which is of poor quality will, in the long run, cause the house to be unsatisfactory. Knots weaken the structure, while dampness permits drying out and the opening up of cracks in various places.

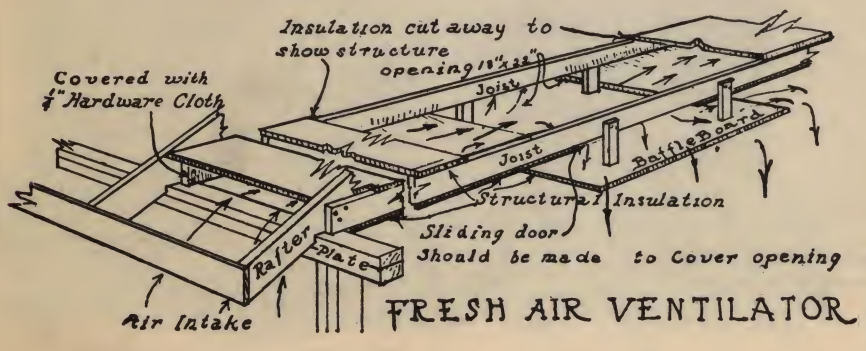
Referring to cracks and openings, leads us to the subject of insulation. A poultry house in our climate must be pretty well insulated to be satisfactory. In climates that are moderate, a single wall house built with matched drop siding may give satisfactory results, but wherever temperatures reach the zero point with any regularity during the winter, it becomes necessary to build a tight house.

Use Insulating Board

The most efficient and most economical way of insulating a poultry house is by means of insulating board. Boards of that sort are easy to put on, are about the same price as good lumber, and have greater insulating value. Our house is completely lined with structural insulating boards, and is, therefore, well protected.

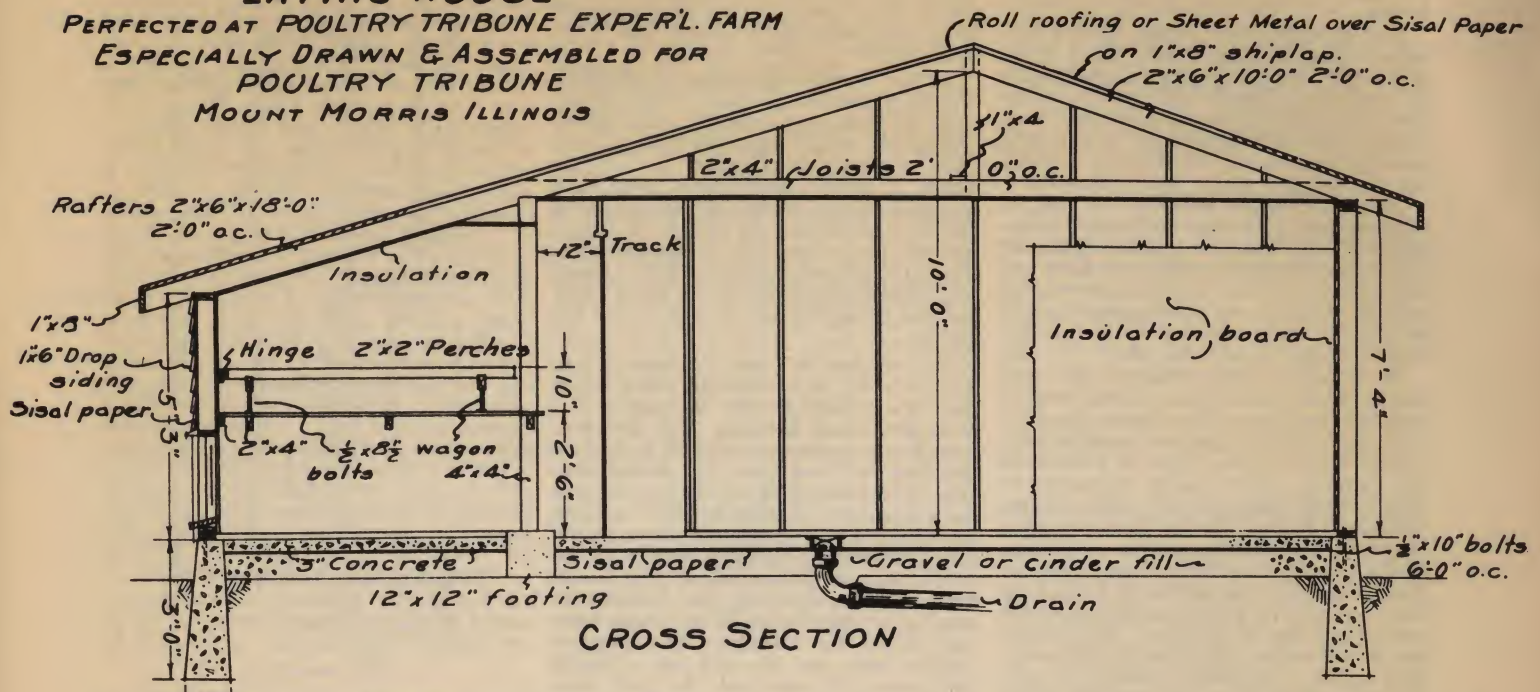
We believe in insulating a house because insulation keeps a house warm, prevents drafts and makes the ventilation problem simpler. When it is warmer inside the house than outside, the exchange of air takes place almost automatically. Where the climate is mild, it may be possible to avoid trouble by insulating only the north and the west walls of the house, but even in such climates complete insulation will have its advantages. It helps to keep out the heat and keep the house cool in summer, in the same way that it helps to keep the house warm in winter.

According to the blue print, a 24 by 24 unit of this house has approximately 45 square feet of window area in the

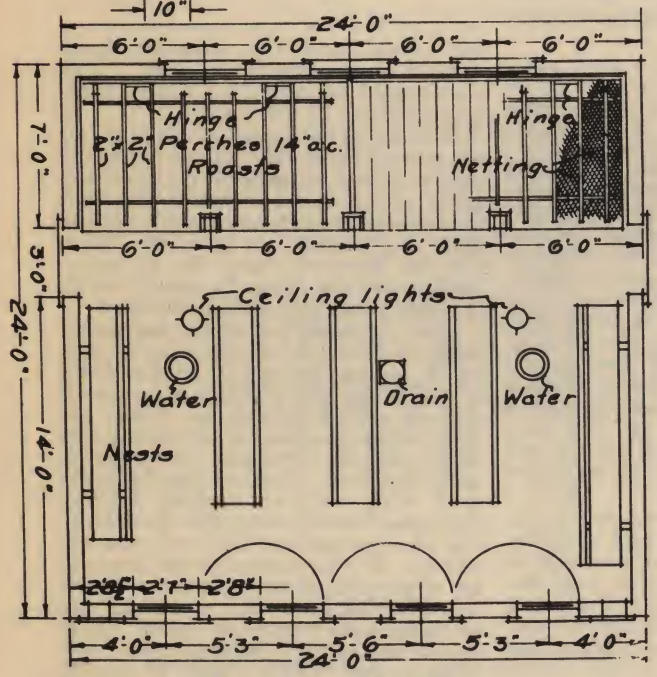


-24'x24' COMBINATION ROOF LAYING HOUSE-

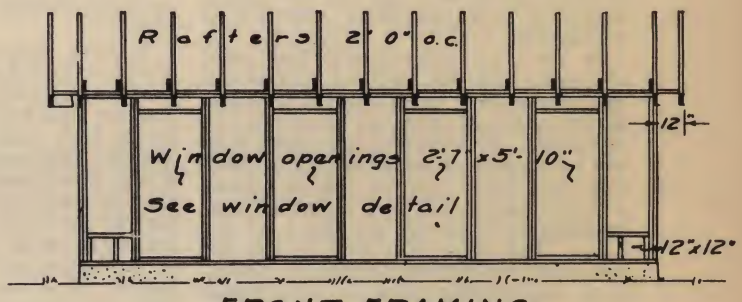
PERFECTED AT POULTRY TRIBUNE EXPER'L. FARM
ESPECIALLY DRAWN & ASSEMBLED FOR
POULTRY TRIBUNE
MOUNT MORRIS ILLINOIS



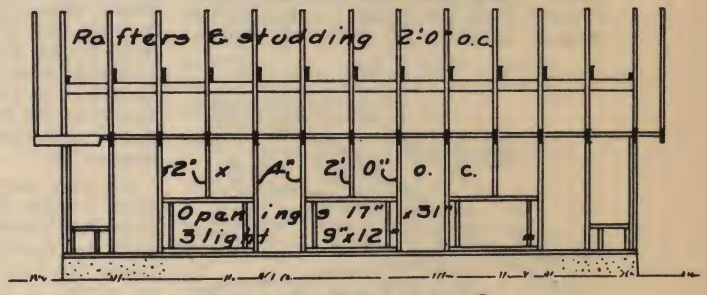
CROSS SECTION



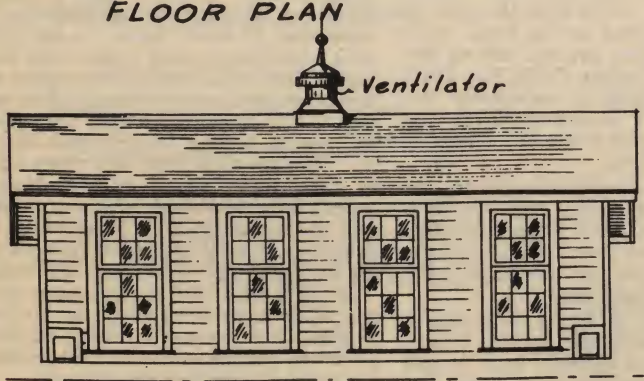
FLOOR PLAN



FRONT FRAMING

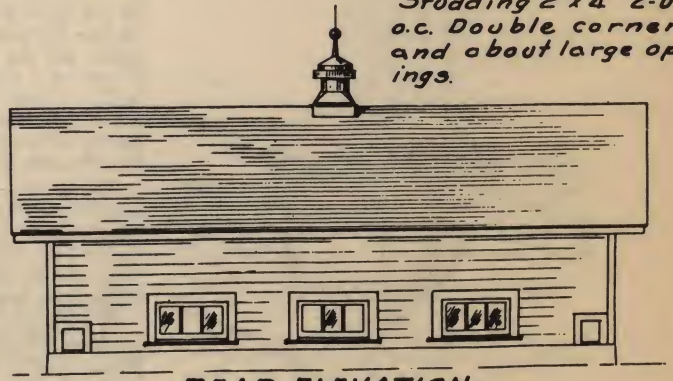


REAR FRAMING



FRONT ELEVATION

Studding 2"x4" 2'-0" o.c. Double corners and about large openings.



REAR ELEVATION

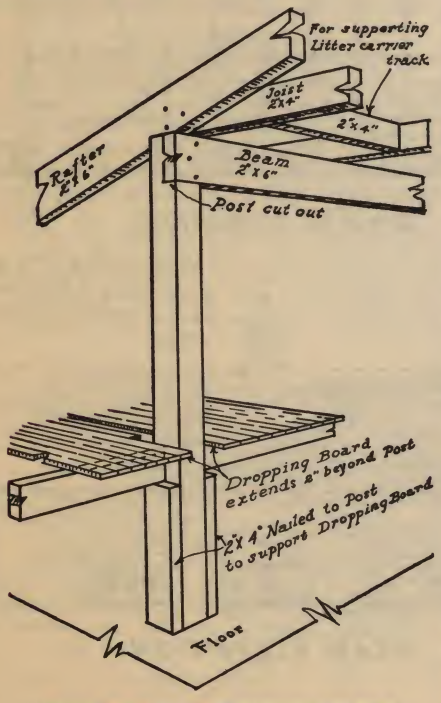
front. According to most poultry house authorities, it is desirable to have one square foot of window space for every 15 square feet of floor space in the house.

Accordingly, this house, having 576 square feet of floor space, has a little more than the necessary window space in the front. While the front window size is specified, it is not absolutely necessary that that dimension be followed exactly because of the leeway allowed by the window space now available.

Most carpenters will set the kind of window that they can most readily obtain. It may be a few inches smaller or larger than that specified. Before going ahead with the building, it will be well to check up on the window frames available. This applies both for the back and the front windows.

In selecting the windows for this house, there is a wide variety which may be used, but two types seem to give the greatest general satisfaction. Likely the very best type of window is one which either slides sidewise or drops down below the sill when opened. This is a more difficult type to build, however, and does have some disadvantages. Another rather common type of window is the one which is hinged at the top and is swung up against the ceiling during the summer. The principal objection to this type of window is that it must be closed entirely to protect the birds from storms and wind, and cannot be partially opened for ventilation.

In the style suggested in this plan, the upper sash can be tilted back at the top to provide a small amount of ventilation, and still keep out strong winds or storms. If desirable, this upper sash can be dropped down entirely. In summer, the entire window can be swung around against the wall, allowing plenty of open space at the front of the house. This eliminates the necessity for removing the windows entirely in summer, and storing them in some other place. When they are opened in this manner, they are always available for instant closing, in case of sudden storms, and, in general, we feel that this makes the most satisfactory arrangement, although there probably is more danger of the windows getting broken when they open in this position, and they must be securely hinged and properly fitted.



Roof framing, with dropping board.

In the window openings, it probably will be preferable to use a glass substitute or a regular window glass which will admit the ultra-violet rays of sunlight to provide Vitamin D for the birds. If glass substitute is used, tack or nail it to the frame, preferably using laths or moulding to fasten it firmly around the edges. In large openings, glass substitute should be well braced to prevent whipping in the wind. Follow the directions of manufacturers for its use.

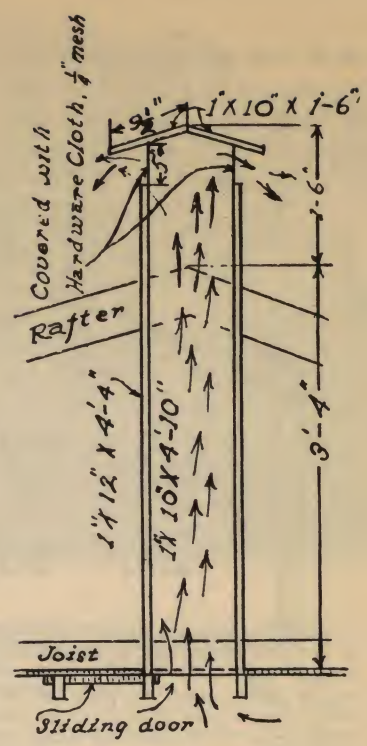
In cleaning the poultry house, it usually is most convenient to drive along the front and throw the litter out through a front opening. For that reason, many poultrymen build a door in the front of each pen. We would suggest that instead of building a door in each pen, the one-inch wire netting, usually placed over each window, should be on a removable frame in one of the windows, and this window used as an opening for cleaning the house. Of course, a litter carrier is much more convenient for cleaning the dropping boards, and can be used for cleaning the house, if preferred. In that case, no front opening is necessary for that purpose.

Another suggestion which some poultrymen might like to follow is to slope the floor gradually to the front, making it about four inches lower in front than at the back wall. This slope is not noticeable when working in the house, yet if rain should happen to blow in through the windows, the water will drain back toward the front of the house. Also if the floor drains are placed in the front of the house, it then becomes a simple matter to scrub the entire floor and have the water drain to a convenient point. Another advantage of a sloping floor is that the litter will tend to remain in the front of the house, instead of being scratched back under the dropping boards as it usually is. The floor shown in the accompanying plan is not sloped and this is simply an alternate suggestion.

Another point which was difficult to show in the plan is the fact that the dropping boards are hinged to the back wall, yet there is a four inch space between the dropping boards and the wall to permit a better circulation of air. This is especially necessary when the house is heated. This is best shown in the floor plan. Note that the boards at the hinges extend to the back wall, while all the others are cut off at the 2" by 4", four inches from the back wall. Such hinging is especially desirable because it makes cleaning the house so much easier when the dropping boards can be raised.

When we first built this house, we insulated the side walls, and put in a straw loft. Since that time, however, the straw loft has been taken out entirely, and the ceiling insulated with structural insulation board.

We found that a straw loft had a number of disadvantages in this house. First of all, it is a difficult task to get straw into a house of this style, because of the small space above the ceiling. After the straw was in for a short time, it became exceedingly dusty and dirty, and the slightest touch brought down a cloud of dust. This also tended to make the house somewhat dark.



Roof ventilator.

In a house as long as this, the air movement above the straw does not seem sufficient to carry off the moisture-laden air, and, as a result, the roof boards seem to rot much more rapidly than they should. In a square house, like the Missouri house, the air movement above the straw is rapid enough to carry away this excess moisture.

With the straw loft eliminated, ventilation is provided by a gravity system, which brings the air in at the front of the house and permits it to escape through ceiling ventilators. There are many different types of ventilating systems, but their general operation is about the same. Intakes may be in the front wall, with an opening through the outer siding near the floor level, and an opening into the room near the ceiling. If the inside of the house is not already lined with insulation board, this duct between two studdings can be closed with insulation board. There should be two such intakes in the front of each pen. Another type of inlet is made by closing the passageway between two 2" by 4" pieces in the ceiling with insulation board above and below. The ceiling itself may be the lower side. The opening is at the front of the house and should be covered with baffle board to prevent strong winds from blowing in. The opening into the room should be three feet ahead of the dropping boards with a slide in it to regulate the size of the opening, and a board suspended a few inches below it to prevent the air from sweeping down too rapidly.

In each 24 by 24 ft. pen, each intake should be approximately 8 by 10 inches in size, and the outlet shaft should be about 18 inches square or 20 inches in diameter if a round one is used.

There is another type of outtake flue which extends down to within about 18 inches of the floor of the poultry

house. This is based on the tneory that the foul air near the floor will be removed and the heat in the building conserved. This type of flue should have an opening near the ceiling which can be opened in warm weather or whenever moisture collects on the walls and ceiling. It is simply another method of securing the same results.

This house is heated with a hot water plant, with the boiler and furnace in a pit in the feed room. We have found it very desirable to heat the laying houses at Poultry Tribune Experimental Farm for a number of reasons. It has been quite definitely accepted that sudden changes in temperature are more disastrous to egg production than a steady, moderate cold. With a heating plant of this kind, we are able to keep the house at a reasonably even temperature; so the birds are not affected by sudden variations in the outside temperature. This heating system also makes it possible to have running water in the pens all winter without danger of having frozen pipes. We keep the house warm enough to prevent the water from freezing, but endeavor to keep the temperature at about 50 degrees or lower.

Incidentally, running water will be found a great convenience in a house of this size. It will save almost an unbelievable amount of work and time if water is available in each pen, instead of having to carry it from a well or other source outside of the house. Plans for such a water system should be made before the house is built, as it usually will be desirable to lay the water pipes under the floor of the house.

Running water can be provided by a gravity system with a large tank from which the water will run to the house, or a pumping outfit can be installed in a well or cistern to maintain a constant supply of water automatically.

If running water is provided, tile drains should be placed in the concrete floor when it is constructed to carry off the overflow from the fountains. These drains also are handy for cleaning fountains and for scrubbing the floor of the house.

The original plan called for a sliding door on both ends of the house, and swinging doors in between pens, if more than one unit is built. We found sliding doors too open and airy for our climate; so it became necessary to build an inside door of insulating material in both ends of the house to give the birds protection from the wind. With that experience in mind, we are now recommending swinging doors on the outside.

Another feature we like is a little exit door in each corner of the pen. There are several reasons for placing a little door in each corner. One is that when birds are driven out of a house, it is much easier to drive them out through a corner. When catching birds for culling purposes where they have to be driven into a catching crate on the outside of the house, the arrangement is mighty handy.

Feed Room for Convenience

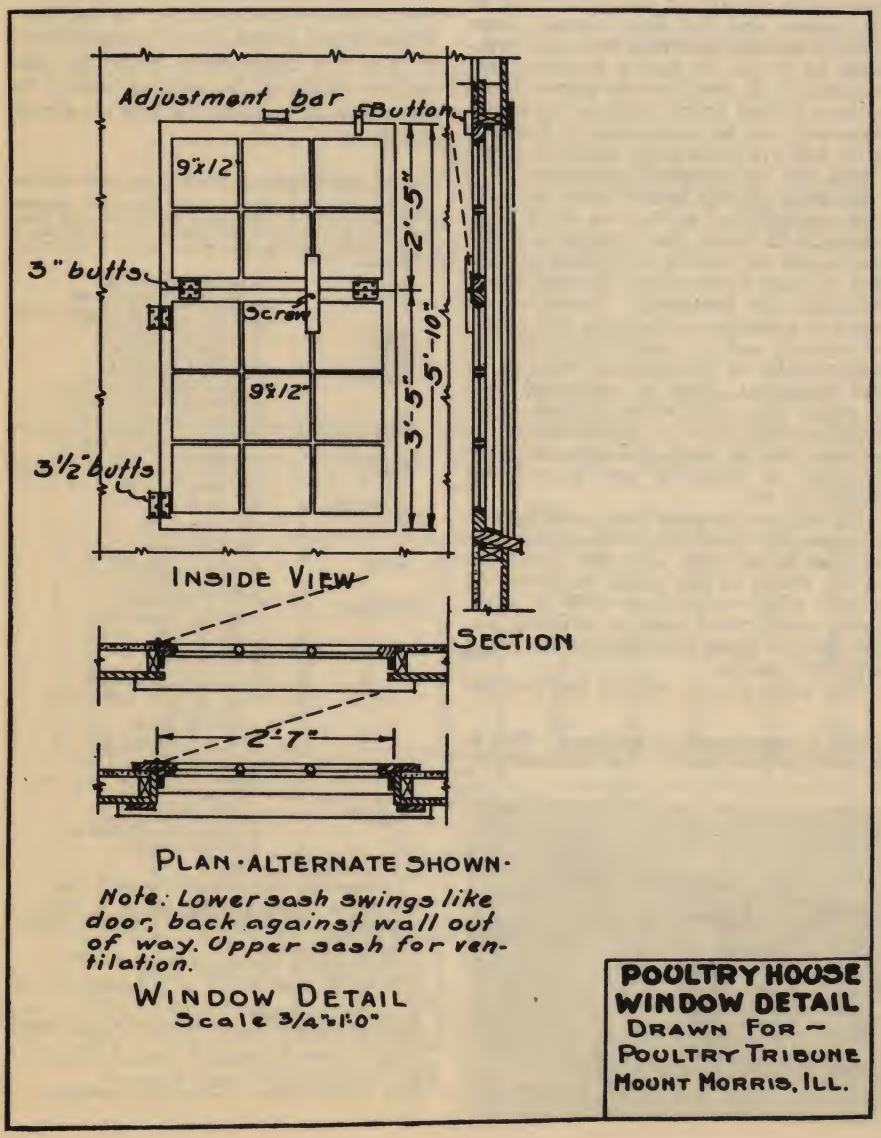
On the east end of our house, we have an eight-foot feed room. It happens to be on the east side because that side is the nearest to the dwelling house and the natural entrance to the poultry house. Where there is more than one unit of 24 by 24 feet, a feed room of any size is mighty handy to have.

This feed room protects the first pen and eliminates the need of double sheathing on the east wall of the first pen.

By taking the bill of material, listed with this plan, to your building supply dealer, it will be possible to learn the exact cost of materials required. Building costs vary so much in different parts of the country that we cannot offer a very accurate estimate as to the cost.

If you want names of manufacturers of insulation materials, ventilating equipment, water systems, heating plants, or equipment for the house, write to *Poultry Tribune*, Mount Morris, Ill., for them.

* * *



BILL OF MATERIAL 24'x24' ONE-STORY HOUSE

Concrete 15 cu. yds. 1:2:4 mix. requires 91 bags cement, 13½ cu. yds. gravel, and 7 cu. yds. sand.
10 cu. yds. cinder or gravel fill.
675 sq. ft. Sisal paper.

Studding	14 pieces 2"x4"x14'-0" cut
	4 pieces 2"x4"x12'-0" cut
	14 pieces 2"x4"x10'-0" gable and cut
	4 pieces 2"x4"x16'-0" cut gable
Sills	8 pieces 2"x4"x12'-0" cut
Plates	6 pieces 2"x4"x12'-0"
Posts	3 pieces 4"x4"x 7'-0"
Girders	4 pieces 2"x6"x12'-0"
Rafters	13 pieces 2"x6"x18'-0"
Rafters	13 pieces 2"x6"x10'-0"
Ceiling joists	11 pieces 2"x4"x18'-0"
Blocking	6 pieces 2"x2"x12'-0" grounds for insulation
Siding	750 bd. ft. No. 116 1"x6"
Roof Sheathing	800 bd. ft. 1"x8" shiplap
Roofing	7 squares
Insulation	1125 sq. ft.
Sisal paper	600 sq. ft.
Sash	4 9-light 9"x12"x1¾"
	4 6-light 9"x12"x1¾"
	3 3-light 9"x12"x1¾"
Netting	50 ln. ft. 36"
Casing	120 ln. ft. 1"x4"
	80 ln. ft. 1"x3"
	50 ln. ft 1"x6"
Hardware	12 ½"x8½" wagon bolts
	16 ⅜"x10" bolts for fastening sills
	15 lb. 1d galv. roofing nails (insulation)
	25 lb. 8d nails
	12 lb. 6d nails
	15 lb. 16d nails
	5 lb. 6d finishing nails
	4 pairs 5" strap hinges (doors)
	2 pairs barn door hooks
	4 pairs 3½" butts galv. for sash
	4 pairs 3" butts galv. for sash
	3 pairs 2½" butts galv. for sash
	4 pairs 5" T hinges—roosts and dropping boards
Paint	3 gallons lead and oil
	1 gallon boiled linseed oil
	1 quart turpentine
Roosts and dropping boards:	Perches 18 pieces 2"x2"x7'-0"
	Supports 12 pieces 2"x4"x12'-0"
	Litter Track Support 2 pieces 2"x4"x12'-0"
	220 bd. ft. 1"x6" flooring

Alternate for Sheet Steel Roofing and Siding

Omit 650 bd. ft. siding; 800 bd. ft. roof sheathing; and 7 squares of roofing.
Add 200 bd. ft. 1" x 4" for roof sheathing spaced 16" o.c.
Roofing: 8.12 squares.
Front, 14 pieces 10' lengths
Rear, 14 pieces 10' lengths and 14 pieces 9' lengths
3 10' lengths copper bearing 28 gauge ridge roll, 14" girth
Siding: 6.48 squares
Front, 5 pieces 8' lengths
Rear, 6 pieces 6' lengths, 6 pieces 4' (cut from 3 pieces)
Ends, each, 12 pieces 8' lengths, 2 pieces 8' (cut)
Nails, 25 lbs. 2" screw drive, lead head, galvanized

20x40 Shed Roof House

A House for Progressive Poultry Raisers

AS ONE drives along a road in almost any section of the country, the most common poultry house of modern type is the long, shed-roof house. It is practically a badge signifying that the builder is interested in profitable poultry keeping.

Most of the state agricultural colleges have recommended a shed roof type of house. The plan which *Poultry Tribune* has adopted, however, is the Ohio shed roof house with some suggested changes which we believe will make it still better.

Twenty feet is the most common width for this type of house. If a house is made much wider than 20 feet, it should have a different and stronger type of roof, while a narrower house is not considered as satisfactory to ventilate and does not give as good protection to the birds. Also, the narrower the house, the more expensive it is to build per unit of floor space. Such houses are usually divided into pens 20 by 20 feet in size. The plan prepared for *Poultry Tribune* is 20 by 40 feet in size, divided into two pens.

Satisfactory for 250 Birds

This size is suitable for about 250 birds, and thus makes a good unit for the average farm, or the house can be extended to make it satisfactory on a commercial poultry farm.

In locating the poultry house, it is well to remember that it may be one unit of a much larger system. Its location should be selected, therefore, with the possibility of expansion in mind. It should be located as convenient to the dwelling house as possible, yet separated somewhat from the other farm buildings. We believe poultry raising will be more successful if the chickens are kept fenced to their own territory. The house should, of course, be faced to secure the greatest amount of sunlight, which in most sections will be toward the south. It is preferable to place it on ground which is slightly higher than the surrounding area and which has good soil and fair drainage. A light or gravelly soil is preferable, but not absolutely necessary.

In building a poultry house, the foundation and floor are very important. Concrete foundations and floors are most satisfactory because they are permanent, easily cleaned, and will keep rats, weasels and other animals from burrowing into the house. A properly constructed concrete floor is drier and warmer than a wood floor. To prevent any possibility of moisture coming through a concrete floor, a layer of waterproof sisal or building paper should be placed over the gravel or cinder fill and the concrete poured on top of the paper. If preferred, a thin layer of concrete can be poured over the gravel fill, the paper placed on top of that, and then the top layer of concrete poured.

Sloping Floor Suggested

If the floor does not extend quite to the top of the foundation the house will be more easily kept clean. While the floor is shown level on the plan, it is suggested that sloping the floor toward the front of the house is an advantage. Litter is not so easily scratched to the back of the house by the hens, and if a sudden storm should blow rain into the front of the house all of the dampness tends to remain at the front instead of running farther back. In this case, the floor drain should be near the front of the house, and the floor should slope slightly toward the drain from all directions so it can be easily scrubbed occasionally. If the floor is sloped three or four inches from front to back, the slope will not be noticeable in walking on it, and yet such slope should be sufficient for all practical purposes.

Because poultry houses must be built high enough for a man to work conveniently in them, they contain a great deal more air space according to the size of the birds than do any other buildings for livestock. Therefore, in order to conserve warmth to the greatest extent, and to make the house as comfortable as possible, it should be well insulated. This is necessary also to make any ventilation system work satisfactorily, for a house must be warmer inside than the outside temperature in order to get a sufficient change of air.

We believe the very best construction for warmth in winter, and, conversely, coolness in summer, is to use insulation on the inside of the house, to cover the outside of the studdings with a windproof, waterproof sisal or building paper, and to place the weather boarding over this paper.

The ceiling, too, should be well insulated, for warm air naturally rises toward the top of the house where it must be held in check. Here again the use of the insulation and sisal or building paper will be well worth while.

The usual interior arrangement can be followed in this house, with nests against the end walls, feed hoppers and fountains through the middle, and the dropping boards and roosts against the back walls. Both the dropping boards and the roosts are shown hinged to the back wall. Hinging the roosts so they can be raised is necessary for easy cleaning of the dropping boards, and raising the dropping boards when the floor needs cleaning makes that job a great deal easier. The dropping boards should be set four inches away from the back wall to allow free circulation of air all around the birds. This is especially necessary in heated houses.

Study Combination Roof Plan

The same general recommendations regarding windows, interior arrangement, and other details, are the same for this house as for the 24' by 24' combination roof plan house given previously, and the suggestions made in connection with that house plan should be studied when considering this shed roof house.

Rear view of Ohio shed roof laying house, showing arrangement of windows. This is one of the most popular styles of houses for the average farm flock. It is recommended in practically all states.

BILL OF MATERIALS for 20x40 SHED ROOF HOUSE

Concrete: foundation wall 10 cu. yds. 1:2:4 mix requires 64 bags cement, 9 cu. yds. gravel and 4½ cu. yds. sand. Floor: 6⅔ cu. yds. 1:2:4 mix requires 40 bags cement, 6 cu. yds. gravel and 3 cu. yds. sand. Gravel or cinder fill, 13 cu. yds.

Sills	6 pieces 2"x4"x20'-0"
Studding	20 pieces 2"x4"x16'-0" cut
	10 pieces 2"x4"x10'-0" cut (rear)
	12 pieces 2"x4"x14'-0" ends
Posts	3 pieces 4"x4"x6'-0"
Girder	4 pieces 2"x6"x20'-0"
Plate	4 pieces 2"x4"x20'-0"
Rafters	21 pieces 2"x6"x12'-0" rear
	21 pieces 2"x6"x10'-0" front
	23 pieces 2"x4"x2'-0" hood
	2 pieces 2"x4"x22'-0" verge
Roof sheathing	1200 bd. ft. shiplap 1"x8" (includes extra for dropping board)
Roofing	10 squares
Siding	1000 bd. ft. No. 116 1"x6" (includes material for doors)
Insulation	1500 sq. ft.
Sisal paper	1800 sq. ft.
Casing	240 ln. ft. 1"x4"
	48 ln. ft. 1"x6"
	96 ln. ft. 1"x3"
Sash	6 9-light 9"x12"x1⅜"
	6 6-light 9"x12"x1⅜"
	6 3-light 9"x12"x1⅜"
Hardware	80 ln. ft. 30" netting
	16 ½"x8½" wagon bolts
	16 ⅝"x10" bolts—sills
	20 lb. 16d nails
	30 lb. 8d nails
	15 lb. 6d nails
	5 lb. 6d finishing nails
	25 lb. 1½" galv. roofing nails (insulation)
	3 pairs 5" hinges
	6 pairs 3½" butts galv.
	6 pairs 3" butts galv.
	6 pairs 2½" butts galv.
	8 pairs 5 T-hinges
	3 hasps and staples
	3 door hooks
Paint	3 gallons lead and oil
	1 gallon boiled linseed oil
	1 quart turpentine

Alternate for Sheet Steel Roofing and Siding

Omit 800 bd. ft. roof sheathing; 640 bd. ft. siding; 10 squares roofing. Add 300 bd. ft. 1" x 4" for roof sheathing, spaced 16" o.c.

Roofing: 11.2 squares

Front, 22 pieces 2' lengths (cut from 6 pieces 8')

Rear, 44 pieces 8', 22 pieces 7' lengths

5 10' lengths copper bearing 28 gauge ridge roll, 14" girth

Siding: 7.42 squares

Front, 10 pieces 9' lengths, 9 pieces 3' (cut from 3 pieces 9')

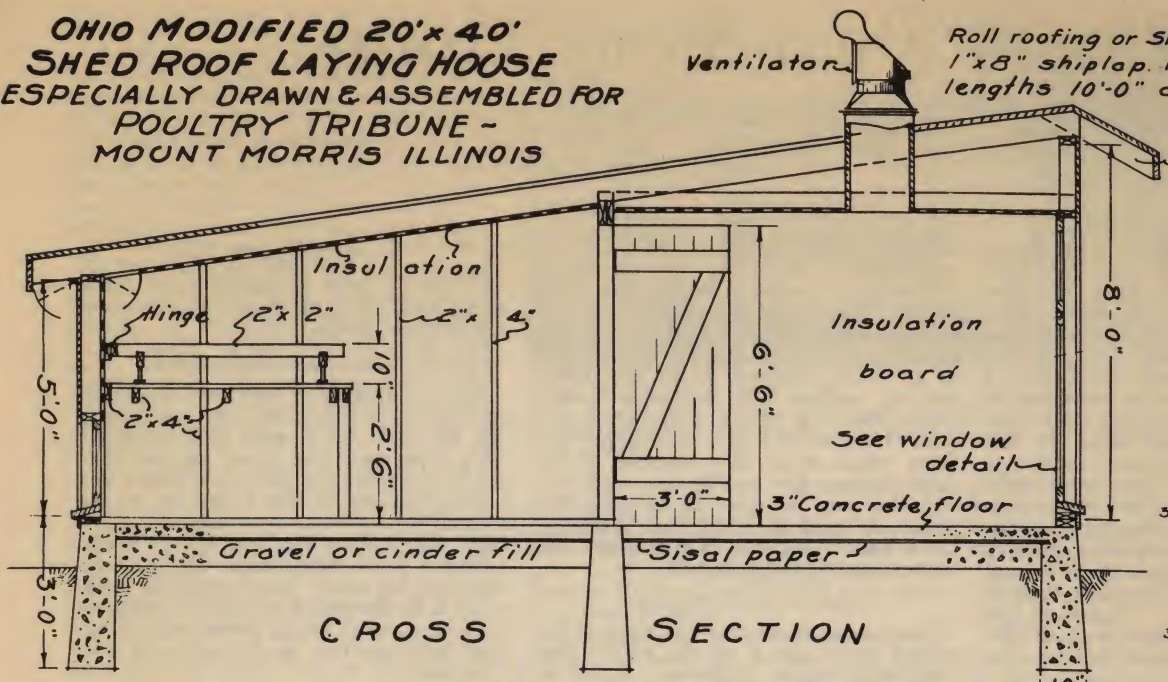
Rear, 13 pieces 6' lengths, 9 pieces 4' (cut from 5 pieces 8')

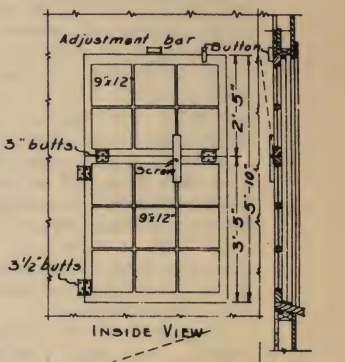
Ends, each, 5 pieces 8' lengths, 5 pieces 6'

Nails, 30 lbs. 2" screw drive, lead head, galvanized

OHIO MODIFIED 20'x 40' SHED ROOF LAYING HOUSE

- ESPECIALLY DRAWN & ASSEMBLED FOR POULTRY TRIBUNE - MOUNT MORRIS ILLINOIS

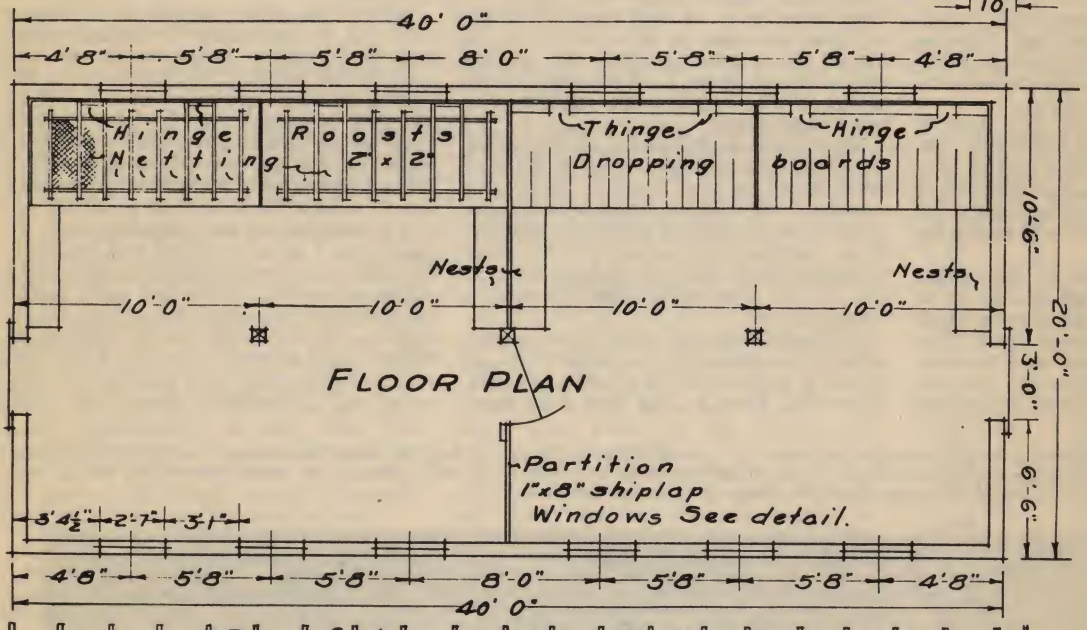


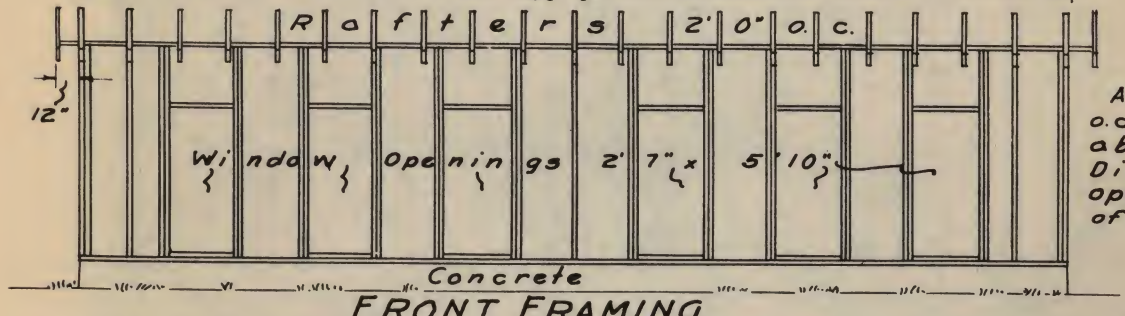


PLAN · ALTERNATE SHOWN ·

Note Lower sash swings like door, back against wall out of way Upper sash for ventilation.

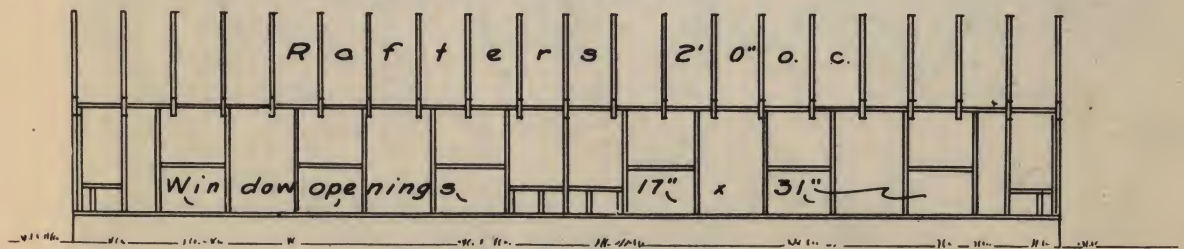
WINDOW DETAIL
Scale 3/4"=1'-0"





FRONT FRAMING

All studding 2"x4" 2:0" o.c. Double all corner and about large openings. Dimensions to center of openings permit change of size.



REAR FRAMING

24x24 Two-Story House

House Designed for Specialized Poultry Raisers
Or Where Amount of Land Is Limited

A TWO-STORY poultry house is no longer a novelty, yet there are few definite plans available to the person who wants to build such a house.

Since it was first determined that pullets can be confined the year around and attain maximum egg production, a large number of two-story houses have been built, yet most of them have been built according to the ideas of the builder alone, and if anyone wanted to duplicate the house, it was practically impossible to get plans for doing so.

Several years ago, *Poultry Tribune* had this plan of a two-story poultry house prepared and hundreds of houses have been built over this plan since it was first announced. While a few changes have been made in it, it has been generally satisfactory from the very beginning.

A house of this type will appeal mainly to the commercial poultry raiser, of course, who keeps large numbers of birds. It will rarely fit into the general farm poultry project.

A two-story house of this sort is more adaptable in duplicate units, taking perhaps 24 by 48 foot length plus feed room as the minimum. The longer the house, within certain limits, of course, the more efficient will be the labor output on it.

Essentially, the plans of this house are the same as those of the 24 by 24 house, but the house is built more solidly to stand the additional load. The posts supporting the roof and the second floor are made stronger and are made to rest upon concrete abutments extending down below the floor line. It is necessary to make these concrete abutments in order to support the additional weight at these points.

The plan of the 24 by 24 unit which constitutes the poultry floor proper is in no way different from any other poultry house. The dropping boards and roosts are in the rear, or on the north side of the house. The large windows which admit the majority of the light are on the south, but they are not the only source of light in the house. In each 24 by 24 unit there are three small windows in the north side under the droppings boards.

Heavier Joists Provided

The joists supporting the floor of the second story are 2 by 6's placed two feet from center to center. Joists of this size, placed as they are, will carry all the load that is ever likely to be placed into a poultry house. The beams consisting of three 2 by 8's rest on the posts, which, in turn, are on the concrete abutments.

An outstanding feature of this *Poultry Tribune* two-story house is the concrete floor on the second story. By means of regulation metal lath obtainable by all dealers of building material, it is possible to pour concrete two inches thick on the second floor and enjoy all the advantages that a concrete floor offers.

The ventilation for this house is provided in identically the same way as that for the preceding one-story house. The outlet flues for the first floor must extend down through the second floor. They can be arranged at each end of the pen in order to bring them down along the partition walls where they will be less in the way.

Feed Room Especially Planned

The 12 foot feed room at the most convenient end of this house is a finishing touch to an already fine building. This feed room can store all the necessary feed for the flock, can house the heating plant, if the house is to be heated, can serve as a packing room for eggs and, if necessary, can have a small bedroom for a hired man. In order to support the extra weight of the feed room it is necessary to build a concrete wall three feet deep, under the partition between the feed room and the first pen.

Before the floor is laid in the feed room, it is necessary to decide what sort of a heating arrangement will be used in the house if the house is to be heated. Every heating plant specifies its own arrangement for the boiler, both as to location on the floor and depth of the pit below the floor line. Some heaters need a six-inch pit, while others need a three or four foot pit. It is a good plan, in fact, the best one, to decide on a heating plant and arrange the feed room accordingly before construction starts. There are some heating plants which specify that the boiler must be at the south end of the house while others demand that the boiler be on the north end. The location of the boiler will determine where the feed

In addition to a comfortable house, suitable equipment is necessary in order for a flock to do its best. One nest for every seven hens, one running foot of hopper space for each 10 birds, providing they can eat from both sides, and water fountains which will supply at least five gallons of water for each 100 birds daily, are the essentials.

will be stored on the first floor. It should not affect the second floor at all.

If the furnace pit is to be located on the south side, as is indicated on this plan, no window is put in the north wall, because feed will be stored there and the window is unnecessary, but if the pit is to be placed in the north end, then a window is constructed there and the south window is closed so as to permit the storage of feed in that corner.

Stairway of Special Design

The stairway leading upstairs is completely enclosed. This is necessary to prevent air suction through the entire house when doors and windows are open. Unless the second floor is tight so that air cannot drop down to the feed room, a strong draft from one end of the house to the other is very apt to develop.

The enclosed stairway has six steps leading up to a platform four feet above the floor level. This platform serves as a landing place on which the turn to the next six steps of the stairway can be made. It also serves as a receiving platform for feeds that are to go upstairs into the feed room. A door opens at one end of it to permit the unloading of feed from a truck right onto this platform. Then it is but a small job to take the feed up the six additional steps to the feed room above. The space under the platform can be utilized for a coal bin, if the furnace pit happens to be on the south side of the house. If the furnace pit is located on the north side of the building the space under this loading platform can be utilized as a storage place.

Strong Supports for Second Floor

In order to support the weight of feed on the second floor, it is necessary to use 2 by 10 joists placed 14 inches apart and running crosswise to the feed room. This means that the floor of the feed room is four inches higher than the floor of the upstairs pens. While this is not the most convenient arrangement, necessitating a step down into the pen each time one goes through the first door, it is necessary to increase the size of the joists in order to carry the load of feed on the second floor.

Provisions are made for a litter carrier both upstairs and downstairs in this house. If the house is long as was suggested previously, a litter carrier can be used to good advantage, both upstairs and downstairs. It will make the cleaning of droppings boards and floors considerably easier.

Inasmuch as a two-story poultry house is of necessity a commercial unit, it is logical to plan to use the upper floor for pullets and the lower floor for breeders a year old or older. The pullets upstairs need not have range, and can be pushed for commercial egg production under confinement. At the end of the intensive laying period, they can be culled out and be placed downstairs in preparation for the breeding season.

The entire house is insulated with insulating materials of approved insulating qualities. The ceiling in the first floor is not absolutely necessary, but will add attractiveness to the place and make it lighter and cleaner.

On the second floor it will become necessary to have a ceiling in order to make the ventilating system work to its fullest efficiency. A ceiling on the second floor will also help to keep the upper floor warm in the winter and cool in the summer.

We would not insist that this is the very best width for a two-story house, and many poultry raisers prefer to build two-story houses several feet wider. When this is done, it is usually desirable to run the house north and south and have windows on both sides of the house, with the roosts and dropping boards in the center. This is covered more fully in the article on multi-story houses.

The same details of window construction and floor construction, as suggested for the one-story 24 by 24 ft. house, can be followed in this two-story house plan. Of course, the arrangement of equipment and fixtures in the house are the same as in the one-story building.

A 2-story house built from these plans. A different window arrangement, which we think is preferable to the arrangement in this building, is now shown in the plans. Cleaning chutes on the outside will make the work of removing litter and droppings much easier.

BILL OF MATERIAL

Concrete—Foundation wall 8 cu. yds. 1:2:4 mix requires 50 bags cement, 7.5 yds. gravel, 3½ cu. yds. sand. Fill, 10 cu. yds. gravel or cinder. Floor, first—5 cu. yds. 1:2:4 mix requires 31 bags cement, 4½ cu. yds. gravel and 2¼ cu. yds. sand. Sisal paper 675 sq. ft.

Floor, second—4 cu. yds. 1:2:4 mix requires 28 bags cement, 3½ cu. yds. fine pebbles and 2 cu. yds. sand.

National Mfg. fabric 65 sq. yds. in rolls. (Johns-Manville Co.)

Sills	8 pieces 2x4x12'-0"
Studding	20 pieces 2x4x14'-0" front
	15 pieces 2x4x12'-0" rear
	12 pieces 2x4x16'-0" gables
	14 pieces 2x4x12'-0"
Plate	6 pieces 2x4x12'-0"
Posts	7 pieces 4x4x6'-0"
Girders	12 pieces 2x8x12'-0"
	4 pieces 2x6x12'-0"
Ribbon	4 pieces 1x6x12'-0"
Ceiling	13 pieces 2x4x8'-0"
Rafters	13 pieces 2x6x18'-0"
Rafters	13 pieces 2x6x10'-0"
Joists	13 pieces 2x6x16'-0"
	13 pieces 2x6x8'-0"
Blocking	14 pieces 2x2x10'-0"
Roof Sheathing	800 bd. ft. 1"x8" shiplap
Roofing	7 squares
	1200 sq. ft. Sisal paper
Siding	1300 bd. ft. No. 116 1"x6"
Sash	8 9-light 9x12x1¾" thick
	8 6-light 9x12x1⅜"
	6 3-light 9x12x1⅜"
Casing	200 ln. ft. 1"x4"
	64 ln. ft. 1"x3"
	64 ln. ft. 1"x6"
Insulation	2250 sq. ft.
Hardware	24 ½"x8½" wagon bolts
	12 ⅝x10 bolts (sills)
	30 lb. 1½" galv. roofing nails (insulation)
	40 lb. 8d nails
	20 lb. 6d nails
	25 lb. 16d nails
	10 lb. 6d finishing nails
	8 pairs 5" strap hinges
	6 hasps and hooks
	8 pairs 3½" butts galv.
	8 pairs 3" butts galv.
	6 pairs 2½" butts galv.
Paint	3 gallons lead and oil
	1 gallon boiled linseed oil
	1 quart turpentine
Feed Room	Use one half of 24'x24' Unit except sash. Sash 4 9-lt. 9x12x1⅜". Add stairs 12 risers x 7½" rise. 10" tread 30" wide
Dropping boards and roosts	
Perches	36 pieces 2"x2"x7'-0"
Supports	24 pieces 2"x4"x12'-0"
Track Support	6 pieces 2"x4"x12'-0"
	500 bd. ft. flooring—sufficient for tables

Alternate for Sheet Steel Roofing and Siding

Omit 1100 bd. ft. siding; 800 bd. ft. roof sheathing; 7 squares roofing. Add 250 bd. ft. 1" x 4" for roof sheathing spaced 16" o.c.

Roofing: 8.12 squares

Front, 14 pieces 10' lengths

Rear, 14 pieces 10' lengths, 14 pieces 9'

3 10' lengths copper bearing 28 gauge ridge roll, 14" girth

Siding: 9.42 squares

Front, 10 pieces, 7' length

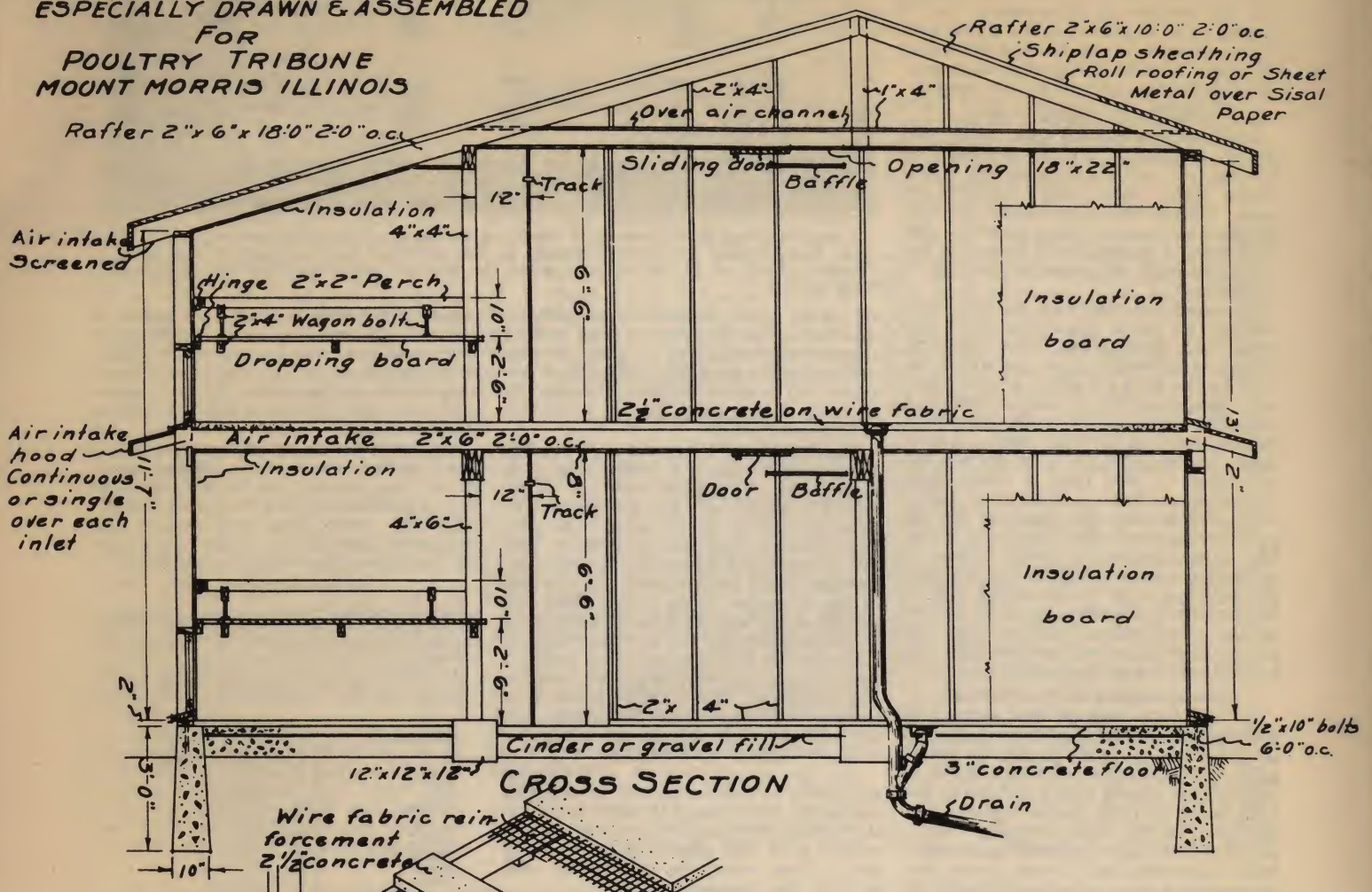
Rear, 6 pieces 7' length, 12 pieces 5', 2 pieces 8' (cut)

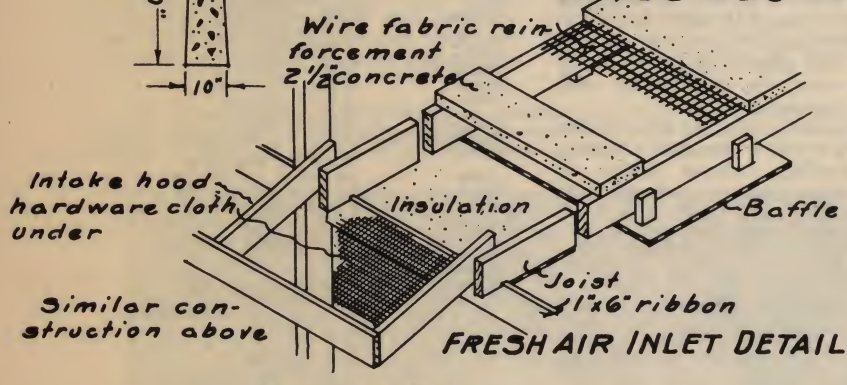
Ends, each, 24 pieces 7', 2 pieces 8' (cut)

Nails, 30 lbs. 2" screw drive, lead head, galvanized

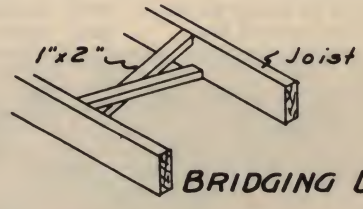
This combination roof house, developed at Washington State College, Pullman, Washington, was used as the basis in preparing plans for both the one-story and two-story combination roof houses shown in this book.

24' x 24' TWO STORY POULTRY HOUSE - ESPECIALLY DRAWN & ASSEMBLED FOR POULTRY TRIBUNE MOUNT MORRIS ILLINOIS



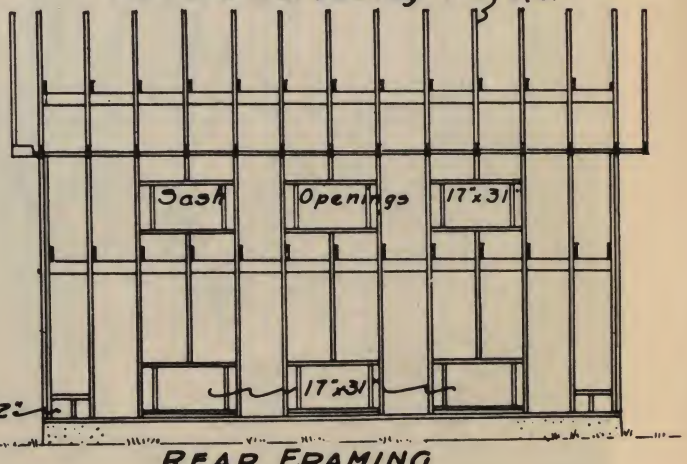


FRESH AIR INLET DETAIL

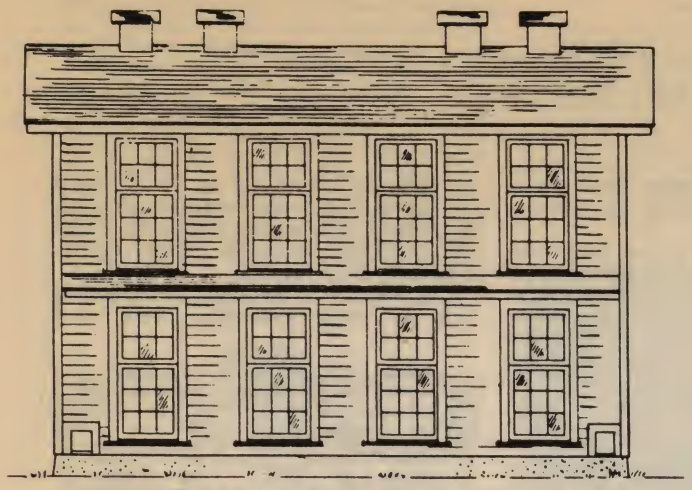


BRIDGING DETAIL

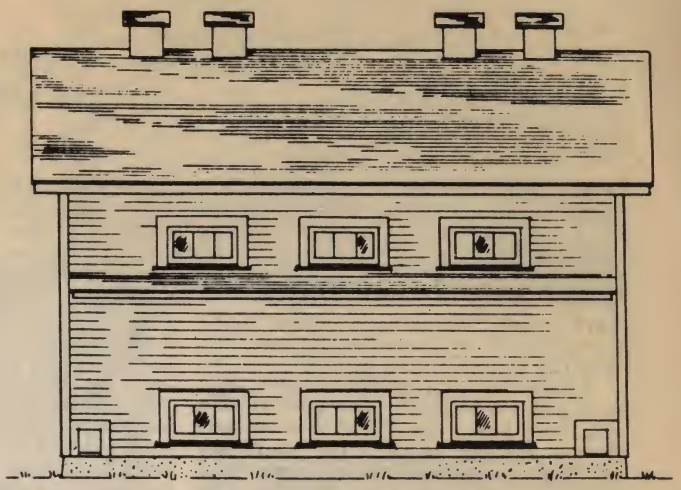
FRONT FRAMING



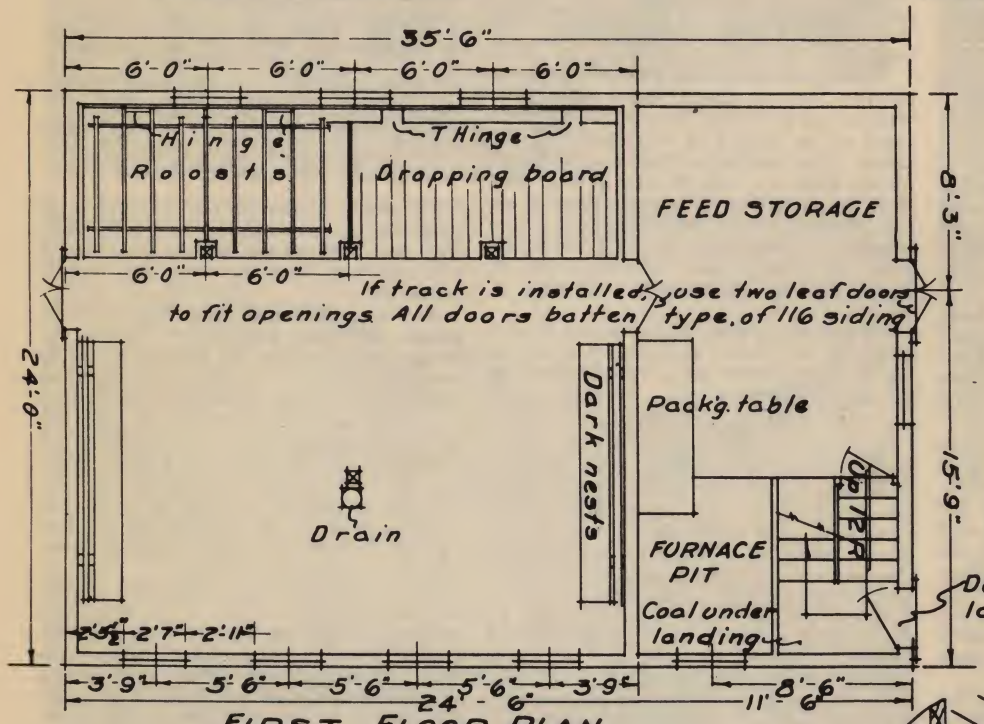
REAR FRAMING



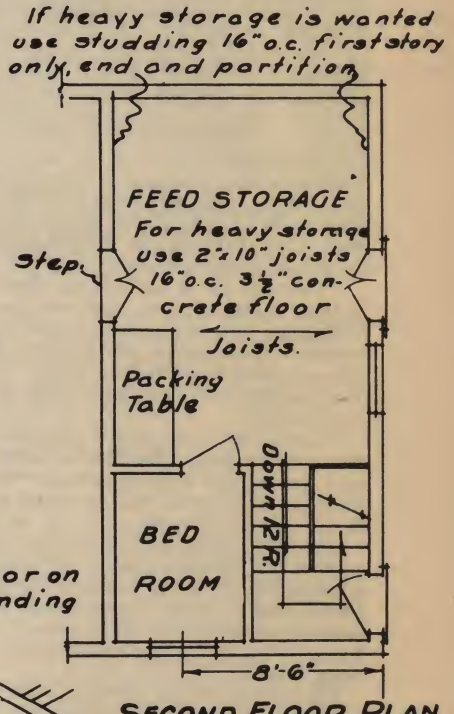
FRONT ELEVATION



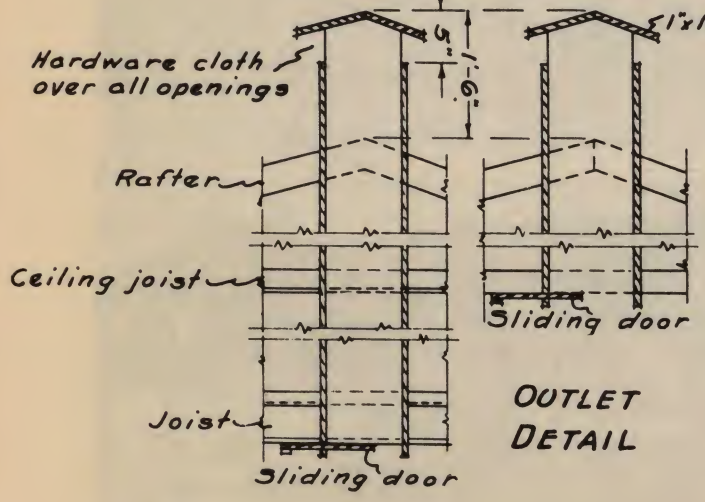
REAR ELEVATION



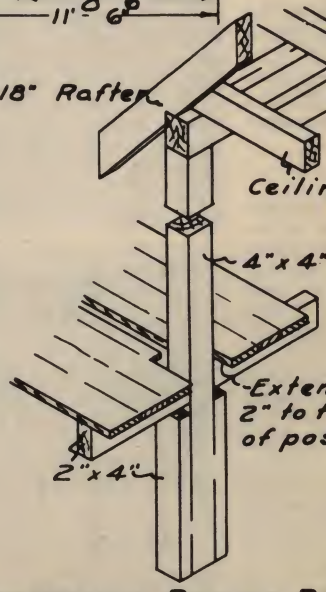
FIRST FLOOR PLAN



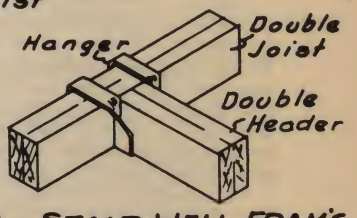
SECOND FLOOR PLAN



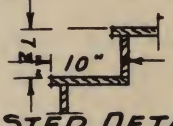
OUTLET DETAIL



DROPPING BOARD DETAIL



STAIR WELL FRAM'G.



STEP DETAIL

Multi-Story Houses

This Type of House Growing in Favor with Commercial Poultrymen—
No Standardized Plans Available

WHEN it comes to building poultry houses more than two stories high, it is pretty much a case of every man for himself.

Poultry raisers who build multi-story houses usually are large producers who have specific reasons for wanting multi-story houses and specific ideas of the way the houses should be built.

Houses more than two stories high and built specifically for poultry are relatively new. The trend toward such houses probably began a few years ago when a number of farmers remodeled dairy farms into poultry houses, with several floors.

With the better knowledge of managing laying birds in confinement, there is no reason, of course, why poultry houses should not be built with as many stories as the poultryman wishes.

Number of Advantages

"There are a number of distinct advantages of a room or house of greater than the usual widths of one-floor laying houses," points out D. C. Kennard and V. D. Chamberlin, Ohio Agricultural Experiment Station.

"Ventilation is simplified, there is a better uniformity of temperature both in winter and summer, and the lessened window space for a given area of floor space, with the subdued light, lessens the liability of feather picking and cannibalism.

"Also, the wider, more nearly square room or building afford better insulation and protection against severe weather changes and costs less to construct because of the lessened cost of wall and roof construction and insulation per 100 square feet of floor space. For instance, a room 40 x 60 feet requires about 200 lineal feet of wall as compared to 280 lineal feet of wall (40 percent more) for a 20 x 120 laying house of the same floor area.

"A still more important point in the economy of poultry housing is to make the roof serve two or more floors. The roof is the most expensive part of poultry housing, and it involves by far the greater part of the cost of maintenance afterward."

Less Labor Required

When a multi-story house is properly planned, it also can be a labor saver. In at least one instance, one man takes care of 5,500 birds in a four-story laying house. That means that one man does all of the cleaning, feeding, egg gathering and watering, but he does not grade and pack the eggs.

"In view of these facts it would seem that a poultryman can ill afford to build a long one-floor laying house where the number of layers exceeds 500," Kennard and Chamberlin continue.

"In other words, it is our opinion that the best and most economical poultry house for 500 layers is a two-floor house 30 x 30 feet; for 800 to 900 layers a two-floor house 40 x 40 feet; or for 1,200 to 1,400 layers a two-floor house 40 x 60 feet. The best arrangement of all is where a large floor space can be made available in a barn or other large building suitable for remodeling into housing for the layers.

"The one-floor, long laying house was designed to accommodate a comparatively small number of layers on range. Notwithstanding the advantages to be realized from small groups of layers on a good range, neither the range nor the one-floor long type of laying house is practicable for the management of the larger numbers of layers involved in commercial egg production. Since the layers can be successfully kept indoors, the larger scale poultryman generally finds it preferable to keep the layers confined. For him it would seem that the one-floor long laying house is obsolete."

When a house is built more than two stories high, it should have some provisions for servicing it from the ground level or by means of elevators. Many times, it is possible to build such a house on the side of a hill, in such a way that it is possible to enter each floor from the ground level. Furthermore, there should be sufficient capacity on each floor to justify the inconvenience of going up and down several flights of stairs.

Of course, it may be more convenient to go up and down stairs than it would be to travel between several buildings all on the ground.

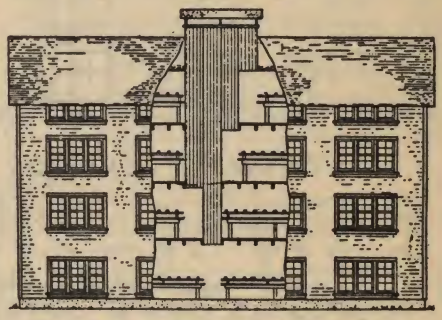
Wide Houses Preferred

In size, there is little uniformity among multi-story houses. In general, it is considered desirable to build them about 30 to 40 feet wide, and divide them into pens about 24 to 30 feet long. There should be solid partitions between the pens to eliminate drafts through the building.

When this type of house is built at least 40 feet wide, it can be divided through the center, making two units about 20 feet wide, and the roosts (or droppings pits) can be put against the center partition, which should be boarded up above the roosts, then the remainder of the partition can be wire.

For convenience in cleaning out the litter and droppings, chutes usually are built either at one end of the house or along the side, so the used litter can be dropped down on to the ground through the chute, or a manure spreader or truck can be driven under the chute and the litter from the upper stories loaded directly into it.

It generally is desirable to build this type of house extending north and south, with about an equal number of windows on the east and west sides. The roosts generally are in the middle, although they can be along one wall if preferred.



The flue system of ventilation for multi-story poultry houses.

The same general rules in regard to floors, windows and other details of construction apply in building multi-story houses, as in building smaller structures. The principal difference is the greater width as a rule, and the increased strength of foundation and framing to carry the heavier load. This is a problem which any good building contractor should be able to work out satisfactorily, and at the same time he can incorporate any special ideas which are wanted.

The accompanying diagram shows how a ventilation system for this type of house could be constructed. A separate flue should be provided for each pen. It is very necessary that there should be no openings into the sides of the flue, nor any connection with flues from other floors. The flue should reach from the ceiling of the pen it serves to a height of two feet above the highest point of the building. The flue should be straight and vertical. In general it should be near the center of the pen.

A three-story house on a New York poultry farm.

By building the flues together in one chimney, a side of the flue from a lower pen forms the side of the flue from an upper pen and thus economizes on material. The flues must be well insulated to operate properly.

The windows usually are used as air inlets for this type of house.

In calculating the size of the outlet flues in pens of this type house, a house containing 500 sq. ft. or less should have a flue 16 by 16 inches; a house containing 650 sq. ft., 18 by 18; a house containing 1,000 sq. ft., 22 by 22; and for larger houses, add two inches to each dimension for each 200 sq. ft. above 1,000.

When a two-story house is built on level ground, the second floor can be serviced with an arrangement such as is shown in this picture (below). A truck is backed up on the incline, and the load of the truck can be transferred to the second floor platform.

Multi-story houses on a Massachusetts farm. This type of house is most popular when large flocks are kept or where land is high in price.

Most tall houses like this one on a Massachusetts poultry farm have elevators, running water, cleaning chutes, and all the other conveniences which save labor.

A lot of time and labor can be saved by storing the feed on the top floor and arranging feed chutes to the lower floors as shown in the picture above. Feed carriers on each floor will facilitate the distribution of the feed through the house.

This seven-story building at the left looks like a dairy barn, but was built specifically for chickens by an Ohio poultryman. It is thoroughly insulated throughout. The feed is elevated to the top floors, then fed back down through chutes as suggested above.

Special chutes on the inside carry the droppings and used litter to the ground floor. A truck or manure spreader can be backed directly under the chutes if desired, or the litter can be piled up and hauled out later.

In the picture below, still another style of multi-story house is illustrated.

Missouri 30 by 30 Straw Loft House

Poultry House Meets Average Farm Standards

THE Missouri straw loft 30 by 30 foot poultry house is an approved farm poultry house. It was built essentially to take care of the needs of an average farm flock on a farm where poultry plays an important part in the scheme of things, but where expansion to extensive poultry keeping is not contemplated. This house, according to Professor H. L. Kempster of the Missouri College of Agriculture, will take care of between 300 and 400 birds, depending on the breed kept.

In the 30 by 30 Missouri straw loft house, the straw is placed on each side of the ten-foot storage floor which extends through the house, under the ridge, from north to south. The straw is placed on 1 by 4's placed four inches apart, extending all the way from the feed floor to the roof. One by fours, 16 feet long, are used and are so placed that they alternate with each other in the center, being placed four inches apart in that manner.

The straw should be about a foot and a half to two feet deep over the slats. The use of slats without nailing is highly recommended because it makes it exceedingly easy to change the straw in the house whenever it becomes necessary. All one has to do is to jerk out the 1 by 4 boards and allow the straw to drop to the bottom.

Move Air Through Louvers

The movement of the air through the straw is facilitated by two louvers opening out of the house, one at the south end and one at the north end, directly under the peak of the roof. The two louvers permit the movement of air but they are small enough not to make the movement too rapid.

Insulation Material Suggested

In order to make the house useful in northern climates, poultrymen have found it necessary to insulate the house against cold weather. This is accomplished by sheathing the inside walls of the house with structural insulation material. This is shown in the sectional view of the blue print. While this insulation is not called for in the original house, it has its advantages even in warmer climates. Just as it serves to keep out the cold and maintain the heat inside during the winter, so it will serve very efficiently to keep out the heat in the summer and make the house very cool. The insulating material on the side walls will do for the sides what the straw loft does for the ceiling.

While definite sizes are given for the windows in the blue print, it will be advisable to check up on what frames are available in the local lumber yard before the framing is finally finished. Any size within a few inches of that recommended will prove satisfactory. It is advisable to cover all windows with a one inch wire netting to keep out sparrows and keep the hens in when the windows are open in the summer time.

In order to prevent the birds from walking around and scratching in the droppings during the day, it is advisable to stretch a wire netting of 1½ inch mesh under the roosts. The best way to place this wire is to put it on the supporting 2 by 4's and under the roost. Putting it between the supporting 2 by 4's and the roost makes it possible to stretch the wire and keep the birds a long distance from the droppings. The wire should be made long enough so that it can extend over the edges eight inches. This eight inch extension is bent down to meet the dropping boards and to keep the birds from crawling in under the wire into the droppings.

BILL OF MATERIAL FOR MISSOURI HOUSE

Framing:

Posts: 16 pcs. 2"x4"x10' Yel. Pine No. 1 common

Rafters: 36 pcs. 2"x4"x 8' Yel. Pine No. 1 common

Sides:
- 8 pcs. 2"x4"x 8' Yel. Pine No. 1 common
- 8 pcs. 2"x4"x10' Yel. Pine No. 1 common
- 22 pcs. 2"x4"x12' Yel. Pine No. 1 common
- 10 pcs. 2"x4"x14' Yel. Pine No. 1 common

Plates & Sills: 12 pcs. 2"x4"x 8' Yel. Pine No. 1 common

Window Sills:
- 4 pcs. 2"x6"x12' Yel. Pine No. 1 common
- 2 pcs. 2"x6"x14' Yel. Pine No. 1 common

Girders:
- 6 pcs. 2"x6"x10' Yel. Pine No. 1 common
- 12 pcs. 2"x8"x10' Yel. Pine No. 1 common

Floor Joists: 16 pcs. 2"x6"x12' Yel. Pine No. 1 common

Straw Loft: 18 pcs. 2"x4"x10' Yel. Pine No. 1 common

Slats for Loft: 88 pcs. 1"x4"x 8' No. 2 White Pine

Finish:

Roof:
- 1296 board feet shiplap 1"x8"
- 1200 sq. ft. roll roofing
- (Nails and cement packed with roofing)

Floor for Feed Room: 330 board feet shiplap

Structural Insulation: 960 sq. ft.

Window and Door Casings:
- 11 pcs. 1"x5"x12' No. 2 White Pine SIS2E
- 7 pcs. ½"x2"x16' No. 2 White Pine

Window Trim: 9 pcs. 1"x3"x12' No. 2 White Pine SIS2E

Corner Trim: 4 pcs. 1"x4"x12' No. 2 White Pine SIS2E

Drop Siding: 1000 sq. ft. No. 2 Yel. Pine

Doors: 50 sq. ft. 4" fir flooring

Windows: 15, six light sash, glass 8"x10".

2 Louvers Curtain:
- 27' of canvas 3' wide
- 30 pieces 1"x3"x12' No. 2 White Pine

Equipment:

Dropping Board:
- 250 sq. ft. 4" Yellow Pine flooring
- 3 pcs. 2"x4"x12'
- 6 pcs. 2"x4"x10'

Roosts:
- 21 pcs. 2"x2"x 8'
- 6 pcs. 2"x4"x10'

Nests: 14 pcs. 1"x12"x10'

Hardware:
- 16 ⅜"x10" bolts, with nut & washer
- 16 ½"x8½" bolts, with nut & washer
- 50 lbs. 16d spikes
- 50 lbs. 8d common nails
- 20 lbs. 6d common nails
- 3 lbs. 4d common nails
- 5 lbs. 8d casing nails
- 2 lbs. wire staples
- 4 pr. 3" butt hinges
- 5 T hinges for doors
- 2 hasp locks (6 in.)
- 174' of 32" poultry netting, 1" mesh
- 5 lbs. 1½" galvanized roofing nails (for structural insulation)

Paint:
- 4 gallons lead & oil paint
- 1 gallon linseed oil
- 1 quart turpentine

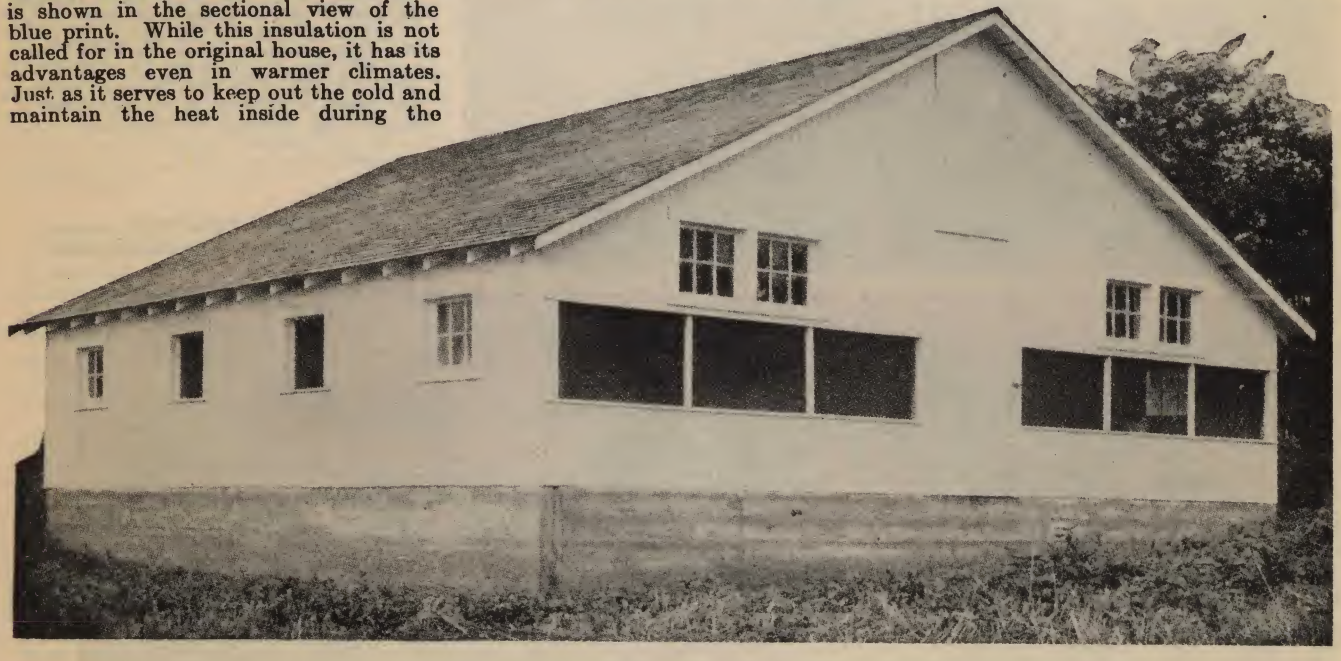
Foundations & Cement Floors:

Fill: 14 cu. yd. cinders or gravel

Foundation & Floor:
- 19 cu. yd. 1-3-5 mixture
- Requires:
  - 84 sacks cement
  - 16 cu. yd. gravel (2½" and under dust screened out)
  - 9½ cu. yd. sand

Top Coat of Floor:
- 1¼ cu. yd. of 1:1½ mixture requires:
  - 18 sacks cement
  - 1½ cu. yd. sand
- 1000 sq. ft. tar paper

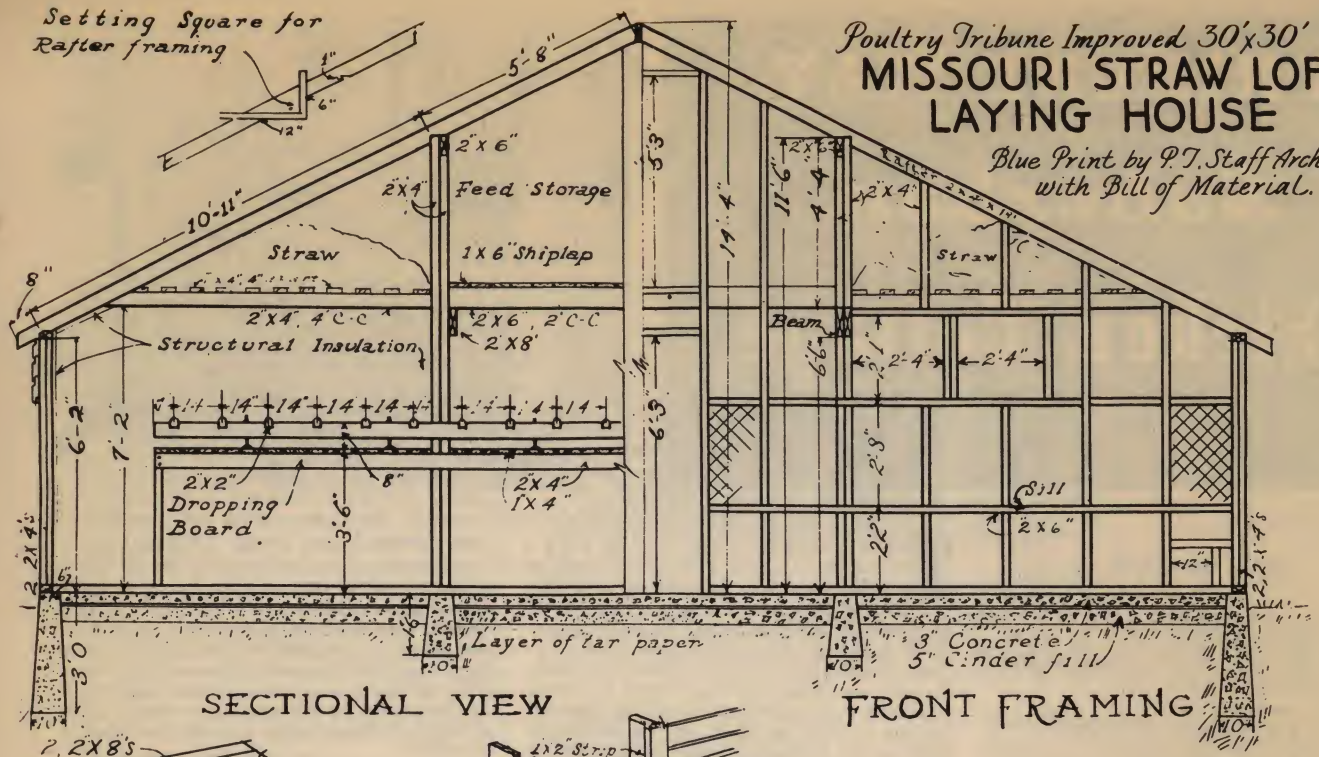
Total Cost of Material: $575.00



Poultry Tribune Improved 30'x30'

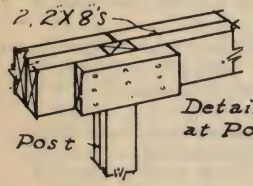
MISSOURI STRAW LOFT LAYING HOUSE

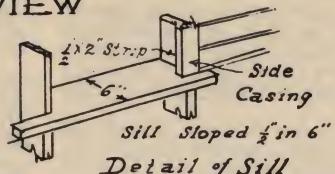
Blue Print by P. T. Staff Architect with Bill of Material.

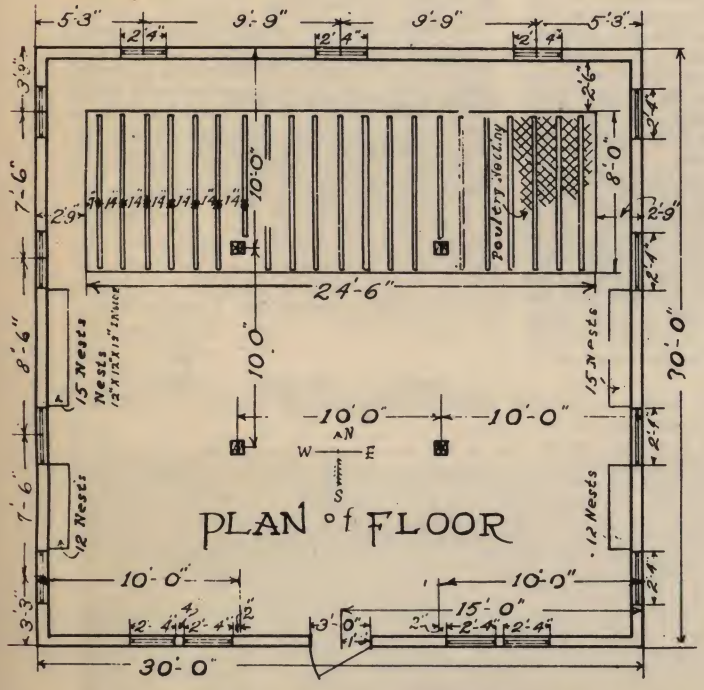


SECTIONAL VIEW

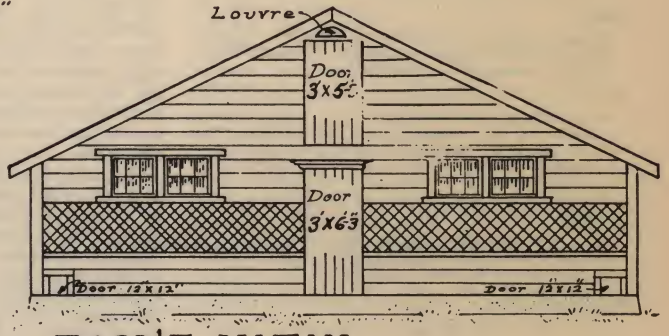
FRONT FRAMING



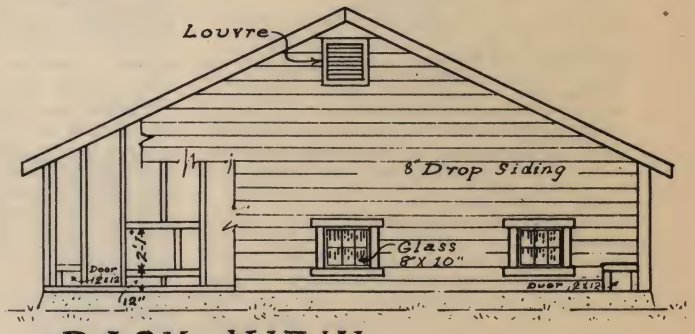




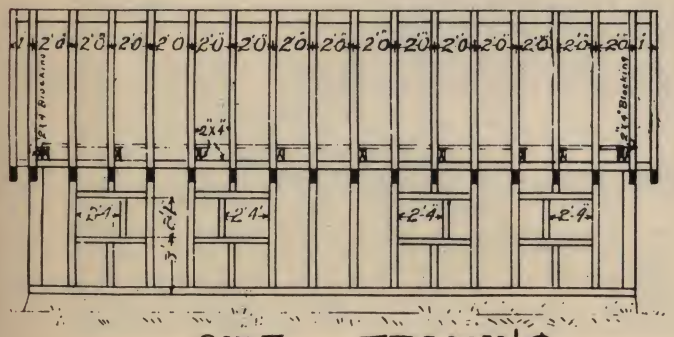
PLAN of FLOOR



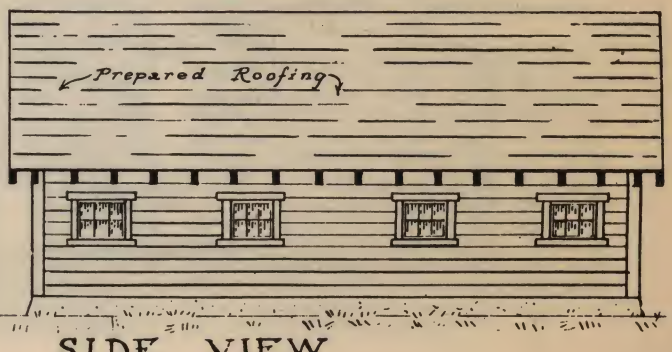
FRONT VIEW



BACK VIEW



SIDE FRAMING



SIDE VIEW

TRIBUNE-WAY *Suburban* Chicken Cottage

Designed at Poultry Tribune Exp. Farm

A bird's-eye view of the house under construction.

Bill of Materials

FLOOR
- 2 pcs. 2" x 4" x 8' floor sills
- 5 pcs. 2" x 4" x 6' floor joists
- 48 board feet 6" flooring
- 3 pcs. 2' x 8'—15/16 in. thick t. & g. insulation board sheathing

FRONT AND BACK WALLS
- 7 pcs. 2" x 2" x 12' plates and studding
- 1 pc. 1" x 6" x 2' window rest
- 1 pc. 1" x 2" x 12' window trim
- 1 pc. 1" x 1" x 12' window stop
- 2 pcs. 4' x 6' structural board for siding or 32 bd. ft. of other siding material

ENDS
- 10 pcs. 2" x 2" x 12' plates and studding
- 2 pcs. 4' x 8' structural board for siding or 64 bd. ft. of other siding material

ROOF
- 9 pcs. 2" x 2" x 10' rafters
- 2 pcs. 4' x 10' structural board for roof (any one of insulation hardboards well painted or asbestos boards) or equal amount of other roofing material
- 2 pcs. 1" x 2" x 8'

FINISH
- 2 pcs. 1" x 6" x 6' cone boards
- 2 pcs. 1" x 4" x 12' corner boards
- 2 pcs. 1" x 3" x 12' corner boards

DROPPING PIT
- 2 pcs. 2" x 2" x 12'
- 1 pc. 1" x 12" x 6'

NESTS
- 1 pc. 1" x 8" x 4' for bottom
- 2 pcs. 1" x 6" x 8' sides and top
- 1 pc. 1" x 4" x 3' ends

HARDWARE AND PAINT
- 2 pairs 3" butt hinges for ventilator doors
- 1 door latch
- 1 pair 4" strap hinges for door
- 1 pc. 1" poultry netting 2' x 7' for window and ventilators
- 1 pc. poultry netting, 1½" mesh, 16 gauge (or heavy as available) 2½' x 6' under roosts
- 1 lb. 16d nails
- 1 lb. 8d casing nails
- 3 lbs. 1" galv. roofing nails
- 1½ gal. white lead and oil paint

THE ACCOMPANYING plan for a 6 x 8 structure to house a backyard flock of a dozen hens was worked out with the idea of presenting a house that would be practical, relatively easy to build, inexpensive, and pleasing in appearance.

It is built quite low with the expectation that the caretaker will not have to spend much time in it. Even so, it is high enough for the average adult to do the necessary work in it without undue inconvenience and it should be the delight of the many children who will be taking care of backyard flocks.

If necessary, it can be built without the use of any critical materials except nails. While steel hinges and fasteners for the door and ventilators are desirable, they are not absolutely essential. Likewise, wire to cover the ventilators and to use under the roosts and for the floor of the sunporch is desirable, but again it is not essential. Laths can be used to cover the ventilators and the sides and top of the sunporch if wire is not available. One by one inch strips can be used for the floor of the sunporch and under the roosts.

The nest is a so-called "tunnel" nest, meaning that it is not divided into individual nests and is open at both ends. It is 14 by 24 inches and rests right on top of the roost frame. It extends two feet toward the back wall from the door, leaving a one-foot space between the end of the nest and the back wall. This permits the hens to walk directly from the roost into the nest. It also makes it possible to gather the eggs without entering the house.

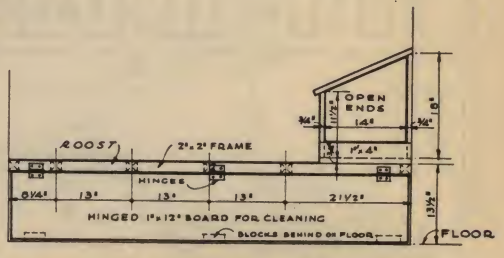
Twelve hens, of course, would require a fountain of one or two gallons capacity and a mash hopper about two feet long, preferably of the floor type. We would suggest that the fountain be put at the left of the door as you face inside the house, and the feed hopper be set in the center of the floor within reach of the door, making it unnecessary to enter the house to refill either of them.

One special reason for needing a double floor is that the house and porch should be set on bricks, concrete or wooden blocks to keep it at least six inches above the ground. This will do much to prevent rats from harboring under the house, but would make a very cold floor if only a single floor should be used.

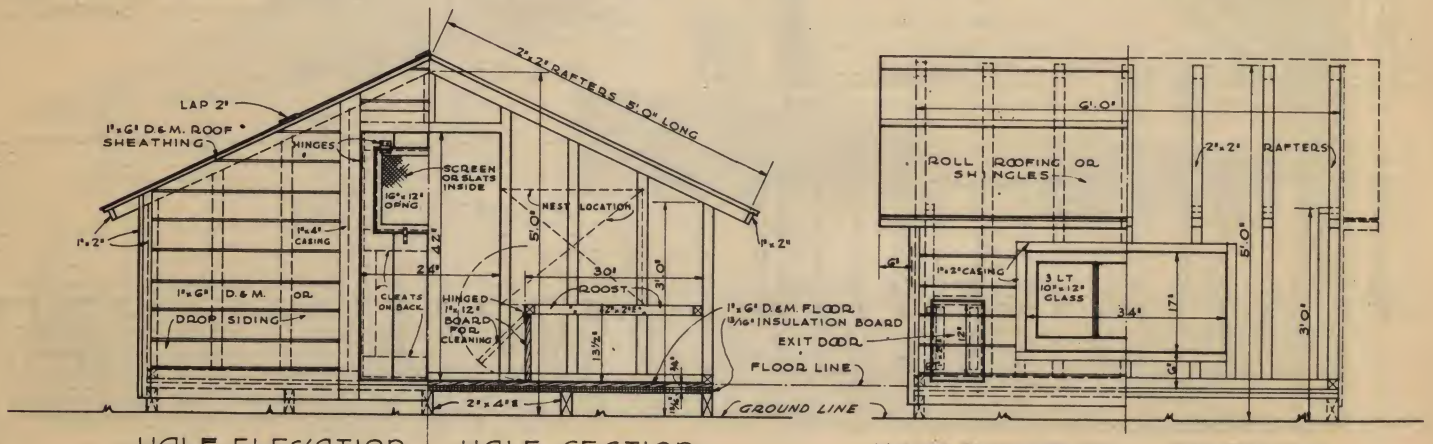
A sunporch is desirable for use with this house. Probably the most convenient size of sunporch would be 6 x 6 ft. and 24 inches high.

It should not be necessary to fasten the sunporch to the house—at least if it is fastened, it should be easy to unfasten and set aside for cleaning.

In building this house, it probably would be most convenient to start by building the floor, then building each side and each half of the roof as a separate unit. All of these finally could be brought together to make the completed structure. The house could be bolted together for easier dismantling if that should be necessary to move it from one location to another.



DETAIL of ROOST.. NEST.. & APRON.. BOARD..



HALF.. ELEVATION.. | HALF.. SECTION | HALF.. ELEVATION | FRAMING.

The Droppings Pit

A Labor-Saving Arrangement Which Is Increasing in Popularity

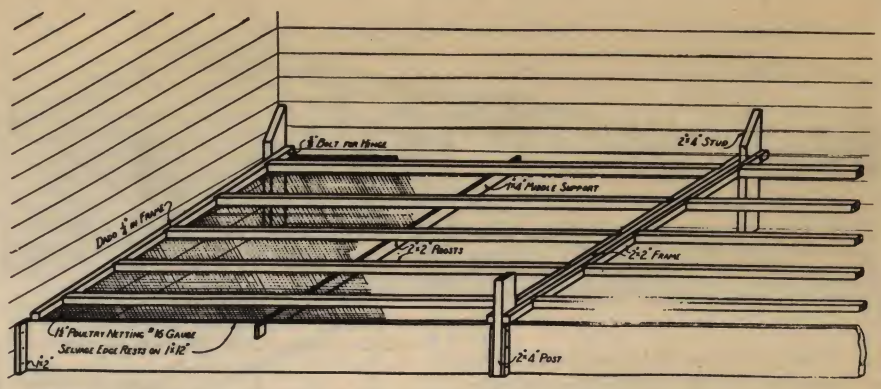
ONE of the desires of every poultry raiser is to take care of the birds as thoroughly as necessary, but to save labor whenever possible, for high labor costs can quickly use up profits.

Because most poultrymen do it every day or at least once or twice a week, cleaning the droppings boards is one of the tasks which most poultry raisers would like to eliminate.

Within the last two or three years, the use of a droppings pit has become popular in a number of states, because of its labor saving feature and other advantages. Since this device first received widespread recommendation by Dr. D. C. Kennard and V. D. Chamberlin, Ohio Agricultural Experiment Station, their suggestions on building such a pit will be followed. Individual poultrymen, of course, had been using variations of this type of pit for some time, but most poultry raisers had been hesitant to try them until after the Ohio recommendation.

In discussing various labor-saving devices in use at the Station, Kennard and Chamberlin say, "Perhaps the principal innovation and the greatest of the labor-saving devices is the droppings pit, which needs to be cleaned only a few times a year in comparison with droppings boards, which are generally cleaned one to three times a week.

"With a droppings pit the roosts are located 12 to 18 inches above the floor. The floor is covered with 1 to 3 inches of straw, shavings, ground corn cobs, or other absorbent material upon which the droppings accumulate. It is not a pit in the true sense of the word, but for lack of a more suitable term it is called a pit. The 2 x 2-inch roosts 8 or 10 feet long are framed into sections by mortising and nailing a 2 x 2-inch piece to the ends of the roosts. A 1 x 4-inch board edgewise supports the center of the roosts. The end pieces of the roost frame extend 7 inches beyond the rear roost and are hinged to the wall or partition so the frame can be turned up out of the way when cleaning the pit. The end pieces of the frame also extend 6 inches beyond the front roost to support the frame by resting on the front side of the pit.



Drawing showing construction of the droppings pit. Note that the roosts are built in sections and bolted at the back so they can be lifted up out of the way when the pit is cleaned. The board along the front is not fastened, but can be lifted up and removed for greater ease in cleaning. (Drawing courtesy of Ohio Agr. Experiment Station).

"The lower side of the roost frame is covered with 1½-inch board and the back is enclosed by three 12-inch boards in the case of a two-pen pit back to back in the center of a room. The back of the frame is hinged a little higher than the front, about 3 inches slope to 6 feet. To discourage the tendency of the birds to roost on the feeders when the roosts are placed only 12 to 18 inches above the floor, the feeders are lowered by the use of 2 x 4's set edgewise for cross supports instead of the higher stands commonly used. The roosting space is calculated on the basis of 8 lineal inches of roost for each layer of the light breeds, and 10 lineal inches for each of the heavier breeds. The distance between roosts is 14 inches center to center for light breeds and 16 inches for heavy breeds.

"Our experience with the droppings pit has also been highly satisfactory in the usual type of unheated laying house, as well as in large rooms equipped for layers. Up-to-date laying houses are being built without droppings boards, and old houses are being modernized and improved by removal of the droppings board.

"Those who contemplate the use of the droppings pit may be confronted by a variety of questions, some of which follow—with answers in accordance with our experience thus far.

"Are the layers on roosts 12 to 18 inches above the floor as comfortable and as free from colds as when they are above droppings boards close to the ceiling? Yes.

"Does the droppings pit foul the air? No.

"Does the droppings pit draw and breed flies in summer? No. The droppings generally dry as fast as they accumulate. Should there be a tendency to draw flies under certain circumstances, an effective prevention is an occasional spray of creosote or some other fly repellent.

"Is not the loss of floor space objectionable? No. The birds make more and better use of the floor space occupied by the roosts than the floor space under droppings boards. An advantage of the pit is that the inconvenience and nuisance of the floor space below droppings boards is avoided. The litter and droppings, in case of the room described, are emptied into a chute which leads into a manure spreader below."

There are a couple of other advantages to droppings pits which Kennard and Chamberlin have not mentioned. Bumblefoot, which occurs frequently in many flocks, is believed to be aggravated when the birds have to jump from high roosts down to hard floors. Then, too, it is believed that jumping up and down from high roosts, nests, and feeders may also play a part in causing internal injuries to the egg organs. Naturally, the low roosts used with droppings pits can no longer be blamed for these conditions.

This picture shows the droppings pits and low feeders in actual use at the Ohio Station. Most poultrymen who have used this equipment are enthusiastic about it.

Extensible Gable-Roof Poultry House

This gable-roof poultry house is similar in type to the one shown in the plans on page 27. Chief feature of this house is its adaptability to expansion. The house may be small to start with, and added to by simply removing the end wall and building on another unit.

This gable-roof type of house, 30 ft. deep, is very popular, for the house may be constructed any length; most conveniently in 10 ft. units. A 30 x 30 ft. house has a capacity of 225 to 250 hens; for flocks of 300 to 340 hens it may be constructed 30 x 40 ft.; and for 450 to 500 hens, 30 x 60 ft. allowing 3½ to 4 sq. ft. of floor space per bird.

The glass area in this gable-roof house is approximately 5 percent of the floor area. A window in the back of each 10 ft. unit will add to the usable floor space and will tend to keep the birds from scratching litter toward the back of the house.

The plans show details of a single wall frame construction. This building may be constructed of concrete or masonry blocks. Uninsulated walls and ceilings of concrete, tile, metal, cement-asbestos board, plywood, and other thin or non-insulating materials may cause moisture condensation on the inside wall in cold or humid weather. This may be prevented or retarded by proper ventilation.

The length of stud in the gable-roof house could be varied slightly to permit more economical use of 4 x 8 ft. building boards.

If a steeper pitch and wider eaves are desired, a longer rafter may be used, or a rafter may be spliced over the purlin. In this latter case the purlin should be two 2 x 6 in. pieces and moved nearer to the center of the rafter span.

A concrete floor is durable and sanitary and is preferable to wood or earth floors.

The roof for this house, one-sixth pitch (inclined 4 in. per ft.) is rather flat for shingle, metal or corrugated cement-asbestos board. Roll roofing or built-up roofing may be used.

The common method of construction is to lay one thickness of sheathing paper, or unsaturated felt, weight about 5 lbs. per 100 sq. ft., over the deck. This paper is lapped 1 to 2 in. Then 3 to 5 layers of 15-pound asphalt felt are laid; each layer should overlap one-third to one-fifth of the width of the material, with a coating of a special asphalt for steep pitches between each layer. The entire surface is then coated with this special asphalt, on which 200 to 300 lbs. of roofing mineral or slag are spread. About 100 lbs. of asphalt per 100 sq. ft. of roof are required.

A bill of materials for a 30 x 30 ft. unit of this house is given below. Also included are materials needed for each 10 ft. addition to the 30 x 30 ft. house.

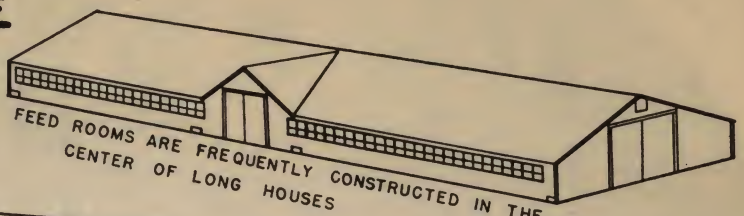
MATERIAL LIST

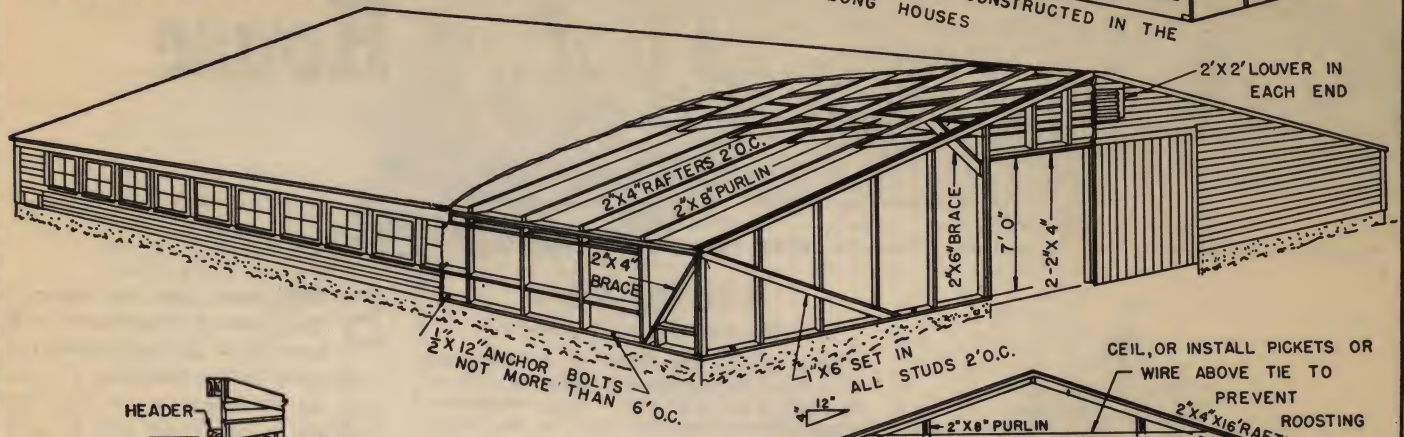
30 Ft. Gable Roof Poultry House (Not including equipment)

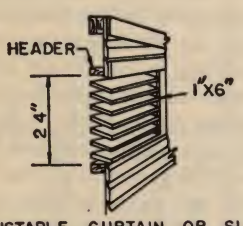
	Material for 30x30 ft. Unit			*Material for Each Additional 10 ft. Unit*	
Item	*No. Pieces*	*Dimension*	*Bd. Ft.*	*No. Pieces*	*Bd. Ft.*
Sills	10	2″ x 4″ x 10′	66	2	14
Studs	36	2″ x 4″ x 5′ (Cut from 10′ piece)	120	10	33
	4	2″ x 4″ x 6′	16		
	8	2″ x 4″ x 8′	43		
	4	2″ x 4″ x 7′	18		
	8	2″ x 4″ x 9′	48		
	8	2″ x 4″ x 3′	18		
Braces	4	2″ x 4″ x 6′	16		
	4	1″ x 6″ x 10′	20		
	4	2″ x 6″ x 4′	16		
Plate	12	2″ x 4″ x 10′	80	4	27
Rafters	36	2″ x 4″ x 16′	384	10	107
Purlin	6	2″ x 8″ x 10′	80	2	27
Posts	4	4″ x 4″ x 9′ (or 8—2″ x 4″ x 9′)	48	2	24
	2	4″ x 4″ x 7′	19		
Headers Window	16	2″ x 4″ x 2′	21	6	8
Ties	14	1″ x 6″ x 18′	126	5	45
Door Header	4	2″ x 4″ x 10′	27		
Window Sills	16	2″ x 6″ x 2′	32	6	12
Ridge Board	3	1″ x 6″ x 10′	15	1	5
Siding		600 sq. ft. plus 20%	720	80 plus 20%	96
Roof Sheathing		960 sq. ft. plus 20%	1,150	320 plus 20%	384
Doors		140 sq. ft. Vert. Car Siding	170		
		5—1″ x 4″ x 16′	30		
Corner and Door Trim (Sometimes omitted)	8	1″ x 4″ x 5′	13		
	4	1″ x 4″ x 7′	9		
Window Casing, Trim, Baffle	6	1″ x 10″ x 10′	50	2	17
	20	1″ x 4″ x 3′	20	7	7
	16	1″ x 2″ x 10′			
		Cut from 8—1″ x 4″ x 10′	27	3	10
Baffle		26 sq. ft.		10 sq. ft.	
Exit & Louver	14	1″ x 6″ x 2′	14		
	14	1″ x 4″ x 2′	10		
		TOTAL BD. FT.	3,426		816
		INSULATION	1,600 sq. ft.	400 sq. ft.	
		MOISTURE BARRIER PAPER	1,600 sq. ft.	400 sq. ft.	
Hardware		10 Squares Roofing		3¼	
		16 4 lt. 9 x 12 Window Sash		6	
		6 pair 12″ Strap Hinges			
		76′ 2″ poultry netting 60″ wide		6 ft.	
		30—½″ dia. x 12″ anchor bolts		4	
		18 cu. yds. 1–2¼–4 concrete		5	
Nails		20 lbs. 6 penny			
		25 lbs. 8 penny			
		5 lbs. 10 penny			
		15 lbs. 16 penny			
		5 lbs. 20 penny			
		(Roofing Nails provided with roofing)			
Tile		4″ drain tile as needed			

30'X30' EXTENSIBLE GABLE-ROOF POULTRY HOUSE

ESPECIALLY DRAWN FOR
POULTRY TRIBUNE
MOUNT MORRIS, ILLINOIS
ADAPTED FROM PLAN BY
PURDUE UNIVERSITY

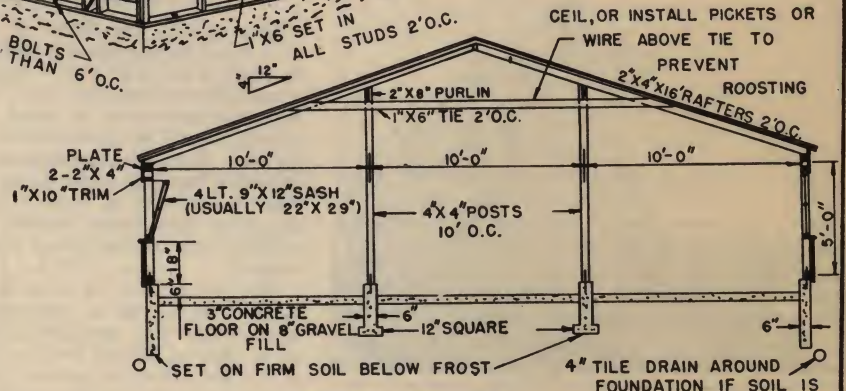




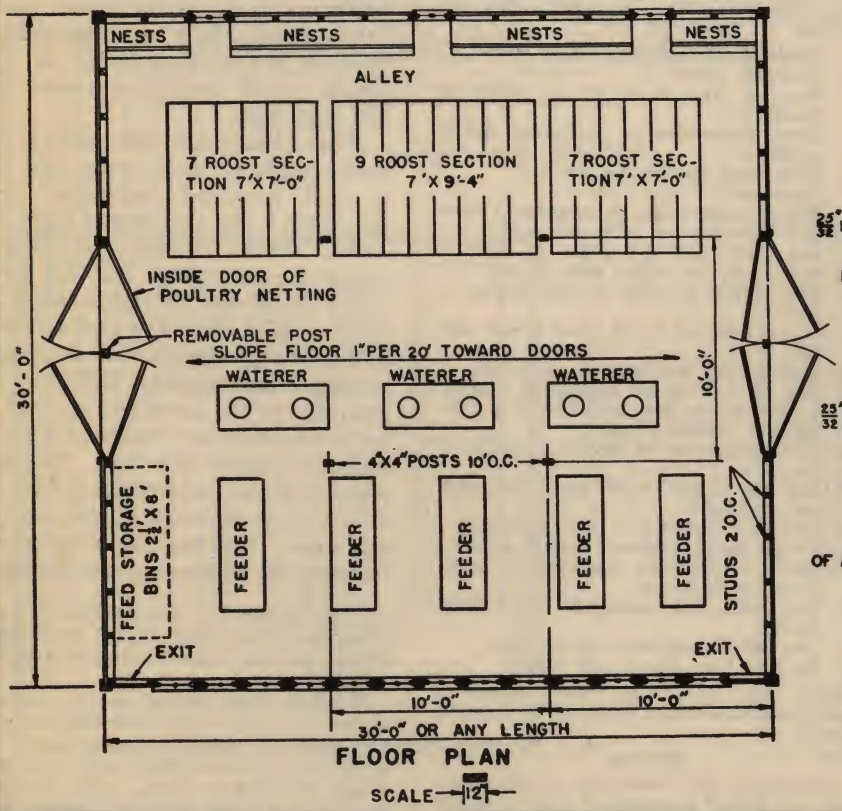


ADJUSTABLE CURTAIN OR SLIDE ON INSIDE TO REGULATE AMOUNT OF OUT-GOING AIR

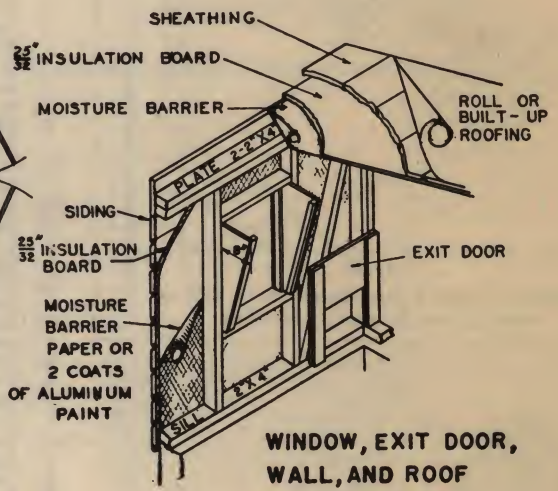
LOUVER DETAIL



CROSS SECTION
SCALE 1/2"



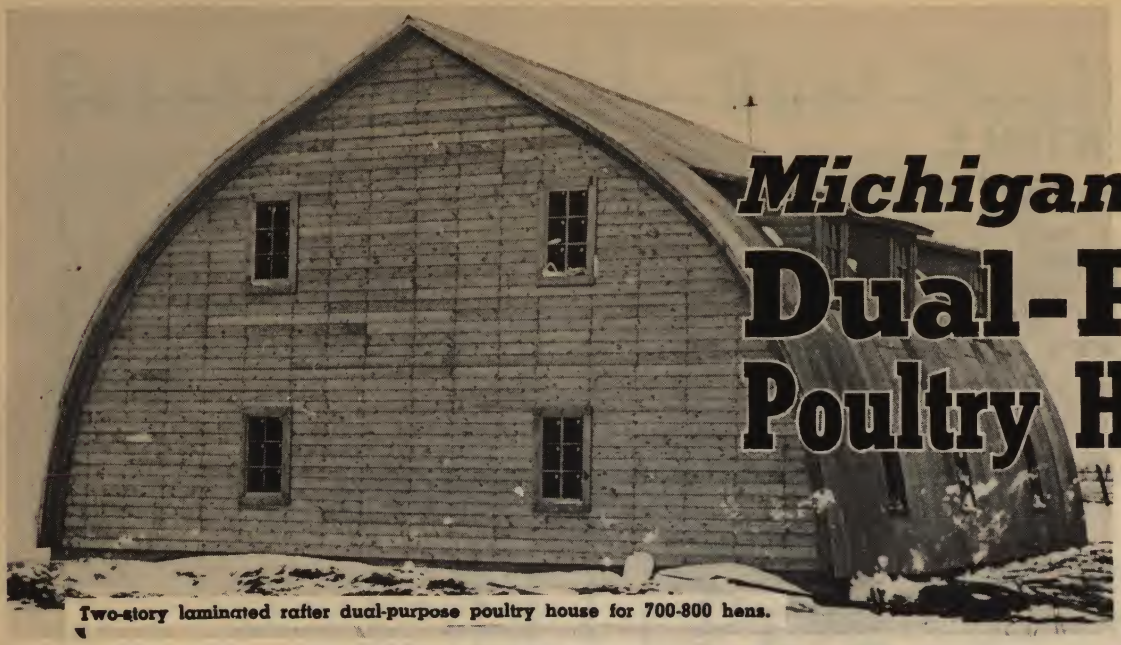
FLOOR PLAN
SCALE 1/2"



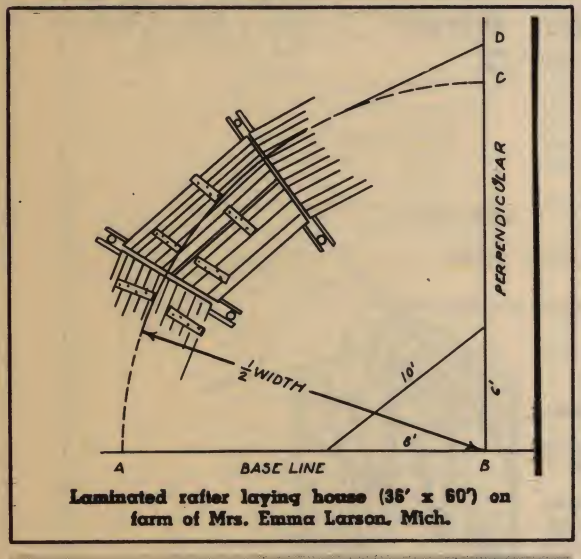
WINDOW, EXIT DOOR, WALL, AND ROOF CONSTRUCTION

F.P.

Michigan's New Dual-Purpose Poultry House



Two-story laminated rafter dual-purpose poultry house for 700-800 hens.



Laminated rafter laying house (36' x 60') on farm of Mrs. Emma Larson, Mich.

Rafter Form Layout

(See drawing at left center)

The rafters are made of 5 layers of 1" x 3" material nailed together in a form to make a rafter 3" x 5". Any dressed or rough-sawed material such as elm, oak, maple or pine may be used. The hardwoods should be used before they have become thoroughly seasoned. This is to facilitate bending and nailing as seasoned material is hard to bend and has a tendency to split when nailed. Laminated rafters may be purchased ready made if desired.

The forms may be made on a wooden floor or on a special platform if no floor is available. The special platform is made of a base of planks laid on cross pieces of 2 x 6's spiked to posts set firmly in the ground. After this has been done, take the following steps in laying out the rafters:

1. Establish straight line (Base Line)
2. Establish point A.
3. Measure from A to B (½ width of building.)
4. Erect perpendicular B-C-(use 6-8-10 method.)
5. With steel tape strike arc A C
6. Measure 2' from C to D.
7. With straight edge, draw tangent from D to intersection with arc A C.
8. Dig holes and set posts at least 6' apart, one on either side of arc.
9. Nail planks to posts at right angles to arc.
10. Lay planks on 2 x 6 cross pieces and nail.
11. Restrike arc and tangent on planks.
12. Nail 2" x 4" x 18" blocks on planks, outside of arc, one end of block touching arc. Blocks 3' apart.
13. Nail another set of blocks 8" inside of arc.
14. Cut one 2" x 6" x 18" wedge for each pair of blocks.
15. Lay in 5 layers of 1 x 3 material.
16. Wedge tightly against outside blocks.
17. Drive laminations endwise to close openings at joints.
18. Nail with 20d spikes 8" apart both sides.
19. Saw off at base and center lines.
20. Remove from forms and repeat.

Note: For barns use radius equal to three-fourths width of building. No tangent needed.

Roofing

Practically all buildings in Michigan have used 1¼" corrugated steel branded with the 2 oz. Seal of Quality. However, any other type of roof covering may be used.

SOME years ago the Agricultural Engineering Department of Michigan State College developed the laminated rafter building for various uses on Michigan farms. This type of building is relatively low in cost because most of it can be built from home grown lumber and relatively inexperienced carpenters can build it. Perhaps its greatest virtue lies in the fact that no cross beams are needed for roof support which makes the entire building available for the different uses for which it is intended.

Four years ago a farmer came to the college. He had $1,000 with which to build a poultry house. He wished to build as much laying house as his funds would allow and was planning to build a shed roof house 20' x 80' which would house not more than 500 Leghorns.

After discussing the matter from every angle he went home and built a well insulated laminated rafter house 36' x 36', two stories high. His entire bill of material and all labor hired came to $865, and his house, when completed, accommodated 700 birds comfortably. The roof was composed of a good quality of corrugated roofing. An outside entrance was provided to the second story, and the entire building was insulated with five inches of planer shavings. Two percent by weight of hydrated lime was added to the shavings to keep out rats and mice. Building paper was placed between the rafters and the sheathing.

Cross ventilation was provided by windows on three sides of the building. A picture of this house is shown at the top of page.

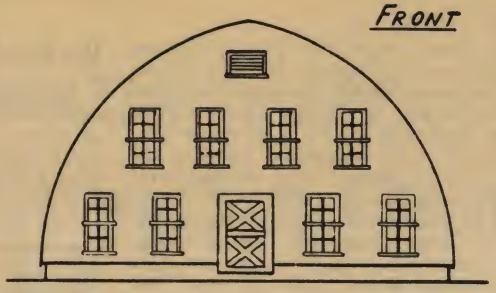
Multiple deck laying houses in some of the midwest states have not proved to be satisfactory for the upper story becomes too hot for summer egg production. Cross ventilation along with plenty of insulation in this type of laying house has solved that problem under Michigan conditions.

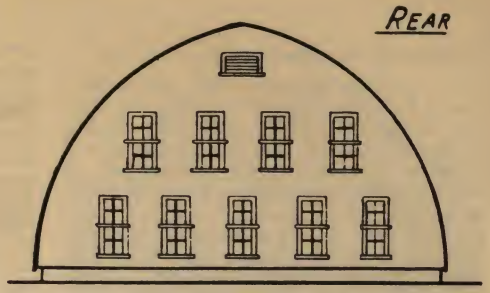
MICHIGAN STATE COLLEGE
AGRICULTURAL ENGINEERING DEPT.
EAST LANSING, MICH.

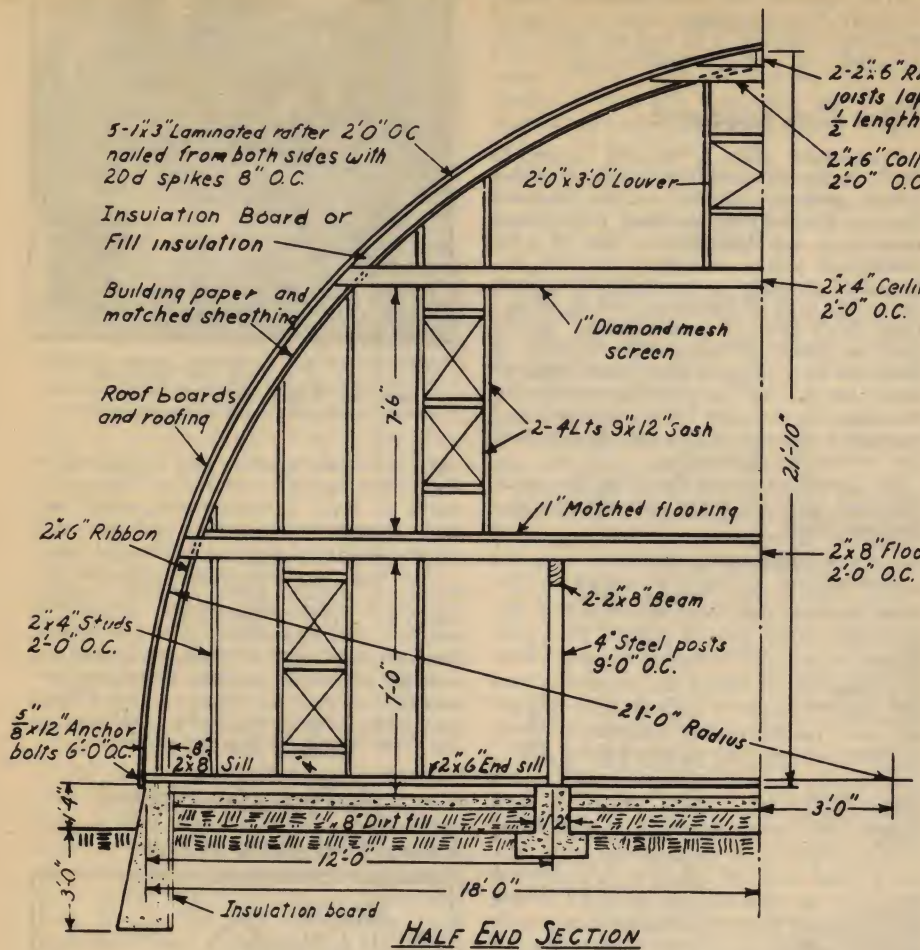
TWO STORY ARCH ROOF POULTRY HOUSE

PLANNED A Bell	APP. BY	
DRAWN H.J.O.		
TRACED O.C.H.	DATE 12/20/41	SHEET
CHECKED C.H.J.	SCALE	No. 72750-13

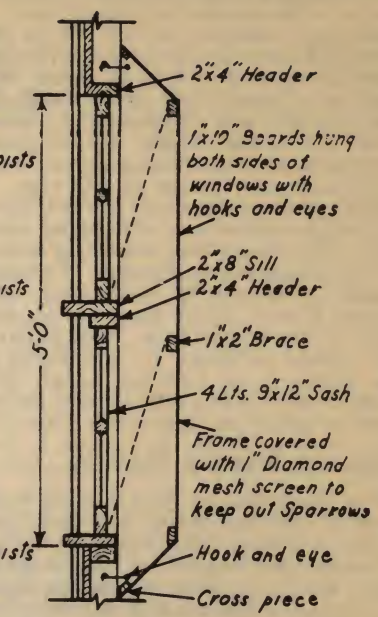
Capacity 700 Birds



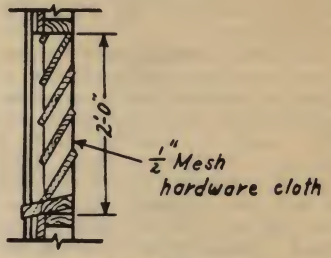




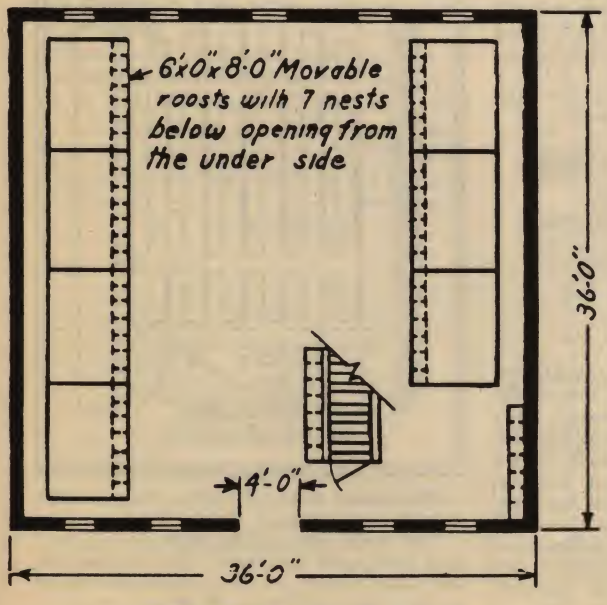
HALF END SECTION



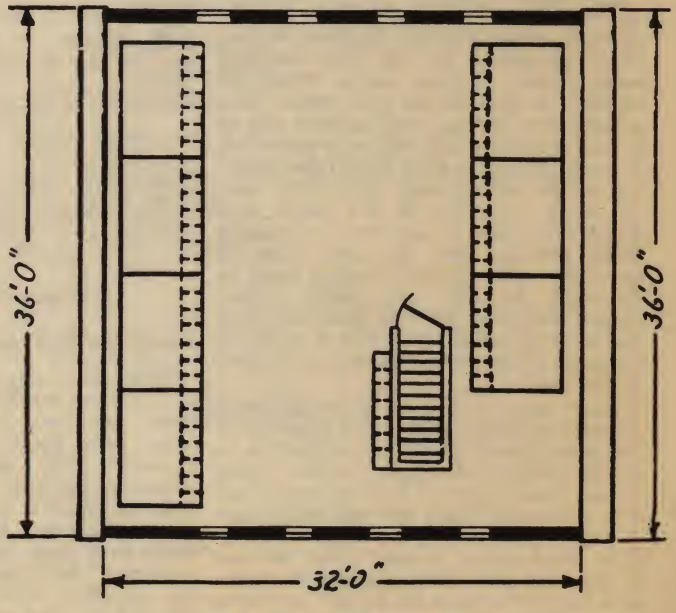
WINDOW DETAIL
Scale 1" = 1'-0"



VENTILATION LOUVER



GROUND FLOOR PLAN



SECOND FLOOR PLAN

Insulation Is Necessity

In northern climates too much emphasis cannot be placed on suitable laying house insulation. All experienced poultrymen agree that ventilation is imperative to profitable egg production. A well insulated laying house always helps in solving the ventilation problem. During the cold season sufficient insulation provides a warmer house, and the additional difference in temperature between the inside and outside air aids in a rapid change of air within the laying house.

For easy cleaning of the 36′ x 36′ laminated rafter laying house the perches have been placed on 6′ x 8′ tables. The nests have been placed under the dropping boards, the birds entering the nests from the inside under the dropping boards and the eggs being gathered from the opposite side on the outside edge.

Many poultrymen would prefer to have an outside entrance to the upper story rather than inside the house as it shows in the accompanying drawing. This will necessitate a covered stairway on the outside because of the hazard of ice and snow in the winter time. Such a stairway should be placed at right angles to the front of the building rather than parallel to it for the latter would cut off window space on both lower stories.

Alternate Window Placings

The illustration on page 6 shows windows on the east, south and west sides of the laminated rafter two-story house. When this plan is followed, three double-deck, four-pane windows on the south and two on each of the east and west sides are sufficient. The drawing shows all the windows on the east and west sides which remove the objection of having to construct dormers on the curved slope of the south side.

The cheek boards placed on both sides of the windows are built on a frame which is attached to the window frame by four hooks only. This frame is covered with one-inch diamond mesh poultry netting or hardware cloth. Two small holes are cut in the netting through which the window openings can be adjusted according to wind and temperature. The netting placed inside the windows rather than on the outside of the window frames prevent the birds from roosting on the windows.

The ceiling of the upper story may be a straw loft composed of three feet of straw supported by one inch diamond mesh poultry netting which should be attached to each of the four walls. This arrangement makes it difficult for rats to invade the straw loft. When a straw loft is used, louvers on each end of the building should be included which will help in better operation of the straw loft. Poultrymen who do not wish to install a straw loft can use the same type of sheathing or insulation board as used on the walls for the upper story ceiling. Added insulation for this type of ceiling can be supplied by using 6 to 8 inches of the same shaving-lime mixture as is used in the walls.

There is no "best" type of laying house. Experience shows that many remodelled barns are giving excellent satisfaction as laying houses. Multiple decked laying houses are economical because every time you go up one story the added expense of a roof is saved. The general tendency is to build laying houses wider because of economy and a more uniform temperature than is found in the longer, narrower type. The poultry and agricultural engineering departments have just issued an extension housing bulletin No. 233, which gives plans and bills of material for three different types of laying houses—the 20′ x 20′ shed roof, the 24′ x 24′ straw loft, and the 36′ x 36′ laminated rafter two-story house. Laying hens in northern climates to produce profitably should be housed in a comfortable, well insulated, well ventilated, adequately lighted laying house that is easily kept clean, one that can be economically built and one that can be operated with a minimum of labor. It really does not matter what the type of building may be; if it has all these requisites, it is a good laying house.

Other Uses Suggested

Sometimes after a poultry house is built, economic conditions change and the owner goes out of the poultry business leaving the building standing empty as a monument to a dead dream. This 36′ x 36′ laminated rafter building can be remodelled readily to accommodate most any other type of livestock such as sheep, hogs, dairy cows, or beef animals. It can also be used as storage for apples or potatoes by adding a little more insulation. Several similar buildings minus the windows have been built for fruit and vegetable storage at one-half the cost of the conventional storage.

By installing large doors in the ends this type building makes an efficient implement shed.

BILL OF MATERIAL

Foundation	17 bbls. cement
	17 yds. gravel
Floor (first)	16 bbls. cement
	16 yds. gravel
Sills	12 pcs. 2 x 8 x 12
Ribbon	6 pcs. 2 x 4 x 12
Rafters	1600 ft. 1 x 3
Ridge pole	6 pcs. 2 x 6 x 12
Roof boards	2250 bd. ft. 1 x 6
Sheathing	2600 bd. ft. 1 x 6
Waterproof paper	2600 sq. ft.
Girders	12 pcs. 2 x 8 x 12
Posts	16 pcs. 2 x 8 x 8 or
	8 pcs 4" steel
Joists (lower)	57 pcs. 2 x 8 x 12
Joists (upper)	38 pcs. 2 x 4 x 12
Second floor	1400 bd. ft. 1 x 6 T & G
Studs	18 pcs. 2 x 4 x 14
	8 pcs. 2 x 4 x 12
	12 pcs. 2 x 4 x 10
	3 pcs. 2 x 4 x 16
Siding	1300 bd. ft. 1 x 6 T & G
Roofing	2450 sq. ft.
Ridge roll	38 lineal ft.
Insulation (fill)	1500 cu. ft.
Insulation (Vaporseal)	6 pcs. 4 x 12 x 25/32
Windows	34—4 lt. 9 x 12 sash
Door	1—2′-6" x 6′-3"
Louvers	1—1 x 6 x 16
	2—1 x 6 x 10
Collar beam	10 pcs. 2 x 6 x 12
Window guards	17 pcs. 1 x 10 x 12
Trim	600 lineal ft. 1 x 4
Headers	20 pcs. 2 x 4 x 12
Window guard strips	17 pcs. 1 x 2 x 12
Wire netting (windows)	120 lineal ft. 26" wide 1" dia. mesh
Wire netting (ceiling)	720 sq. ft. 1" diamond mesh
Anchor bolts	24—½ x 8 carriage
Window guard hangers	68 hooks and eyes 3"
Hinges (door)	1 pr. 8" tee
Tar paper (floor)	1296 sq. ft
Nails	150 lbs. 20d common
	50 lbs. 16d common
	50 lbs. 8d common
	15 lbs. 8d box

Paint for Galvanized Iron

You, no doubt, have some machinery or parts on machinery which are made from galvanized iron. If, through use, these parts begin to rust, they can be protected with a zinc paint which, when properly applied, will prevent further rusting. Rust is a slow kind of burning or oxidation, and takes a tremendous toll each year from the user of galvanized material. Such paint may be hard to get in quantities now, but a small amount applied to a part will stop the rusting.

Do Roofs Need Recoating?

Since the roofs on most poultry houses and brooder houses are relatively flat, there may be a tendency for leaks to show up more quickly than on some of the other farm buildings.

If your poultry house roofs are showing

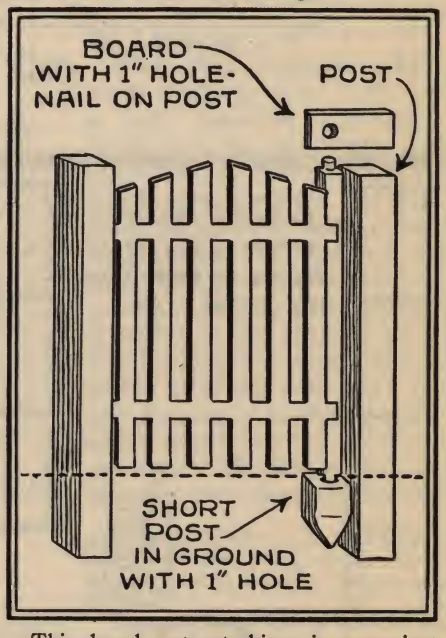
Whether it's on a brooder house, laying house, barn, or dwelling, the application of a good roof coating this summer will do much to prolong the useful life of roofing material.

signs of wear, whether they actually have begun leaking yet or not, it should be worthwhile to apply a roof coating which will make them waterproof again and which will extend the life of the roof for several years.

The most favorable time for making this repair is during warm summer weather when the liquid coating can be brushed on easily. The expenditure of a few dollars for the right kind of roofing repairs this summer will be an excellent investment. Of course, the need for repairs is not limited to poultry house roofs, and all buildings on the farm should be checked carefully.

A Handy Help!

Dowel Post Gate Hinge

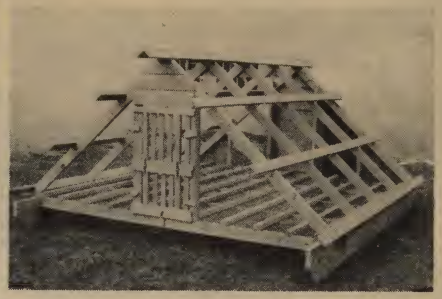


This dowel post gate hinge is convenient to make as shown in the drawing.

The dowel post can be made of a 2 by 2 inch piece, with the dowel 1 inch in diameter and long enough to go through the board at the top.—*Ira Weeks, W. Va.*

From Poultry Tribune Experimental Farm comes

A New Tribune-way Range Shelter



This shelter is simple to build, and anyone who is at all handy with tools should be able to construct one without any difficulty. By taking the bill of materials to your local building supply dealer, you can get an accurate estimate of its cost.

More and more poultry raisers are realizing that the conditions under which pullets are raised have a definite bearing on their livability and production when placed in the laying house. Clean, open range with freedom from crowding and the contamination resulting from crowding does much to insure healthy growing stock.

Range shelters have come into common use as a means of giving pullets ideal growing conditions. The range shelter is nothing more than a dropping pit with a roof over it. Shelters house small groups of birds, usually 100 to 150, and are easily moved, furnish shade and shelter, and are ideal roosting quarters. There is less danger of crowding and overheating than when a whole brood of pullets is allowed to remain in brooder houses during the hot summer months.

A number of types of shelters have been used by poultrymen. Wire floors have become standard equipment. Metal, insulation board, and asbestos-cement sheeting may be used as roofing material.

Often these shelters have been designed with framing lumber much too light to withstand frequent moving. If blown over in a wind storm, little would be left of such a shelter but kindling.

The shelter shown here was designed with the intention of remedying some of the defects of the lightly constructed shelters, but at the same time it is planned to use a minimum amount of lumber. It also can be used earlier in the spring and later in the fall than an entirely open shelter. In fact, in late spring or in mild climates, it can be used as a brooder house by putting in a floor and closing the front with sisal paper or glass substitute.

The skids are constructed of 2 x 12 lumber, and serve as a base to the shelter so it can be moved as one unit. The 2 x 4" joists furnish a rigid floor support over which welded wire fabric is stapled. The framing of the shelter is 2 x 4" lumber, but the light shelters require a truck, horse or tractor to move them, and the same motive power can move this one easily. It also will cost more, but it will last longer and can be used over a longer portion of the year.

During the late fall, also, when it is necessary to hold birds quite late on the range, the rear of the shelter can be closed and the period of usefulness greatly lengthened.

This shelter differs from many that have been designed and used in the past in that the roosts are not elevated above the floor of the shelter, but are attached directly to the floor. This gives more roosting space for the amount of roof area and, at the same time, saves lumber and simplifies construction.

The center section is solid in the rear and individual nests can be attached to it if desired. During hot summer weather, the rear doors can be opened and the air will circulate through the shelter. They can be closed easily in the event of sudden cold snaps. It has been observed over a period of years that the front and rear openings, as found in this shelter, supply sufficient air circulation for the warmest summer temperatures.

The double slatted door for the front is made of 1 x 2 material and has advantages over a hinged door. The lower cross piece rests on the 2 x 4 joist at the bottom. The cross pieces prevent it from falling inward, and wooden buttons hold it in place. Therefore, it is easy to open or close, can't sag, and is never standing out at right angles to form a "pocket" when one is attempting to drive pullets into the shelter. It can be used as a hurdle in driving chickens, and can be hung on a nail on the roof when not needed. The lower half of this door can be opened, and a culling coop set in front of it and the birds driven directly into it to the catching coop, when it is desired to catch them. In cases where it is necessary to shut the birds up in the evening, it can be done easily by leaving the large door in and opening the smaller section each day.

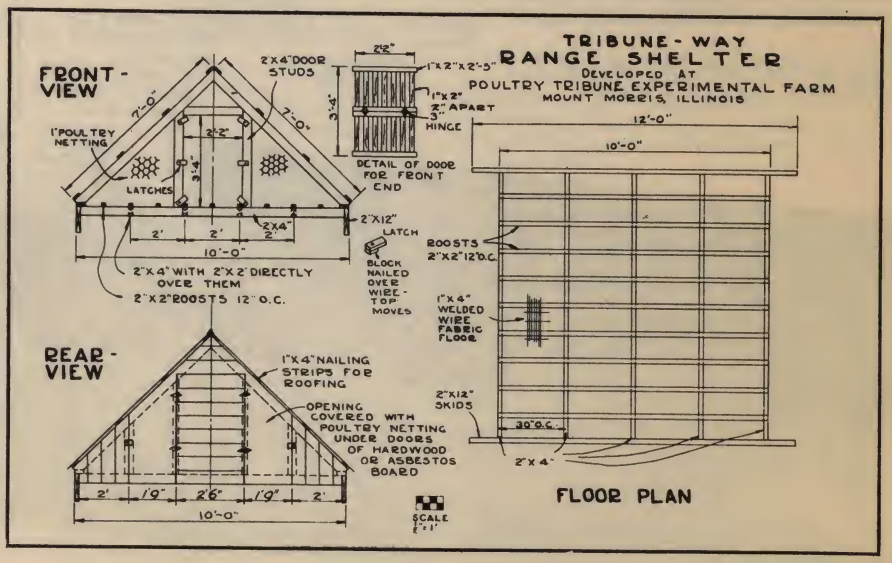
The entire shelter should be painted with oil paint or a good wood preservative. A yearly painting with a good wood preservative, three or four weeks before the pullets are put in the shelter will preserve the shelter and control mites.

The roof framing shown in this plan is designed for attaching sheet metal. If insulation board is used, the 4' x 12' sheets of ¾ inch thickness are best. They can be attached horizontally to the side with the upper sheet overlapping the lower. Extra 1 x 4 nailing plates will give more rigidity to the roof when insulation board is used. It will take three gallons of liquid asphalt paint to waterproof the insulation board. Substitute 1½" roofing nails for those specified if insulation board is used.

If cement-asbestos board is used for roofing, it can be attached best by running it vertically and putting metal batting strips in the cracks between sheets. There are many possible products that can be used as roofing, so the poultry raiser can select that which is most economical or most easily obtained and adjust roof framing to fit the materials used.

BILL OF MATERIALS

- 2 2" x 12" x 12' Skids
- 8 1" x 4" x 12' Nail plates for metal roofing
- 9 2" x 4" x 10' Studs, floor joists and blocking
- 2 2" x 4" x 10' Plates
- 5 1" x 4" x 10' Blocking and rear door frames
- 2 2" x 4" x 14' Rafters
- 3 1" x 4" x 14' Rafters
- 3 1" x 6" x 12' Drop siding or car siding
- 8 1" x 2" x 8' Front door
- 12 sheets 24-inch metal roofing 7 ft. long
- 12 ft. of ridge roll
- 3 lbs. lead head 2" roofing nails
- 100 sq. ft. of heavy (at least 14) gauge welded wire fabric 1" x 2" or 1" x 4" mesh
- 12 ft. of 48-inch wide poultry netting
- ½ lb. poultry netting staples
- 1 lb. 6d nails
- 2 lbs. 16d spikes
- 1 piece of hardboard or asbestos board 4" x 4"
- 3 pairs 3-inch strap hinges



Florida Presents a New Three-Way House

Brooder—Range—Laying . . . All in One

Although the portable, all-purpose house shown at the upper right is particularly adapted to the South, many poultry raisers in other sections of the country will find it useful, too. Those who are beginning with poultry in a small way; farmers and backyarders who keep a small flock to provide eggs mainly for their own use; and larger producers who are looking for a combination brooder and range house, will want to consider it. Slight changes in construction might be desirable to meet sectional needs, but the principle is sound.

A row of these houses on Magnolia Farm, Fla., is shown at the bottom of the page.

Details of construction are shown in the drawings at the right, and the bill of materials needed is given below.

"WHAT is your biggest and most nearly constant problem? The one that, like the poor, is with you always?"

Most poultrymen unhesitatingly will place sanitation at the head of the list; at least, it will be well up on the list of things which make life miserable—at times—for the man who raises chickens for a living.

"What is the best way to provide clean ground for chickens, from the day they are hatched until they quit laying and are sent to market?"

Again, there is almost unanimous agreement, as poultrymen answer, "By rotating range and cultivating the land while it is not being used for poultry."

This is one form of sanitation which has been proven of value, and in which most poultrymen throughout the country believe. But the rub comes in providing shelter for rotated ranges. Colony houses or any other types of permanent buildings are expensive, and portable houses that can be used for anything but chicks have not been entirely satisfactory.

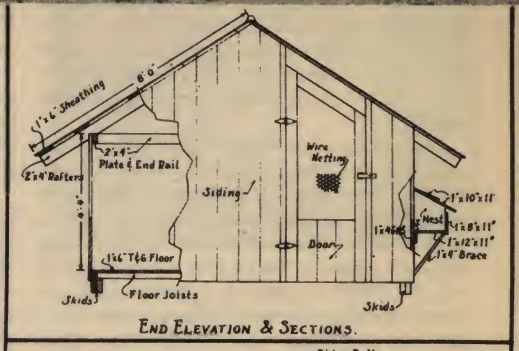
No doubt many poultrymen have thought for a long time that if they just could get a portable house which could be used for brooding chicks, for sheltering pullets on the range, and then could be converted into a good laying house, they would have something really worthwhile.

They can now take courage, for such a "three-way" house is a reality.

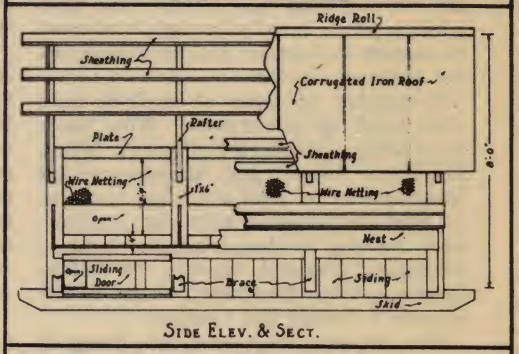
BILL OF MATERIALS

For 10 x 12 ft. "All-Purpose" House:

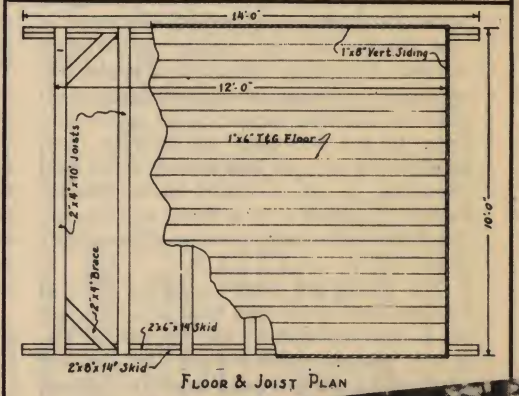
Runners	2 pieces 2″ x 8″ x 14′	—Cypress
	2 pieces 2″ x 6″ x 14′	—Cypress
Joists	7 pieces 2″ x 4″ x 10′	—Cypress
End Rails	2 pieces 2″ x 4″ x 10′	—Pine
Braces	1 piece 2″ x 4″ x 10′	—Cypress
Plates	2 pieces 2″ x 4″ x 12′	—Pine
Rafters	8 pieces 2″ x 4″ x 8′	—Pine
Sheathing	10 pieces 1″ x 6″ x 14′	—Pine
Nest	1 piece 1″ x 8″ x 12′	—Cypress
	2 pieces 1″ x 10″ x 12′	—Cypress
	2 pieces 1″ x 12″ x 12′	—Cypress
	1 piece 1″ x 4″ x 12′	—Cypress
Roost	8 pieces 2″ x 2″ x 6′	—Pine
	4 pieces 1″ x 10″ x 5′	—Pine
	2 pieces 1″ x 4″ x 6′	—Pine
	60 sq. ft. 1½″ 16 gauge poultry netting	
Siding	200 bd. feet	—Cypress
Batting	60 bd. feet (1″ x 3″)	Cypress
Floor	160 bd. feet	Pine
Roof	14 pieces sheet steel 8′	
	2 pieces ridge roll 8′	
Insulation	8 pieces insulating board 4′ x 8′	
Hardware	75 sq. ft., 1″ poultry netting	
	1 pair hinges	Wire staples
	1 door latch	20 d. nails
	1 lock	10 d. nails
		8 d. nails



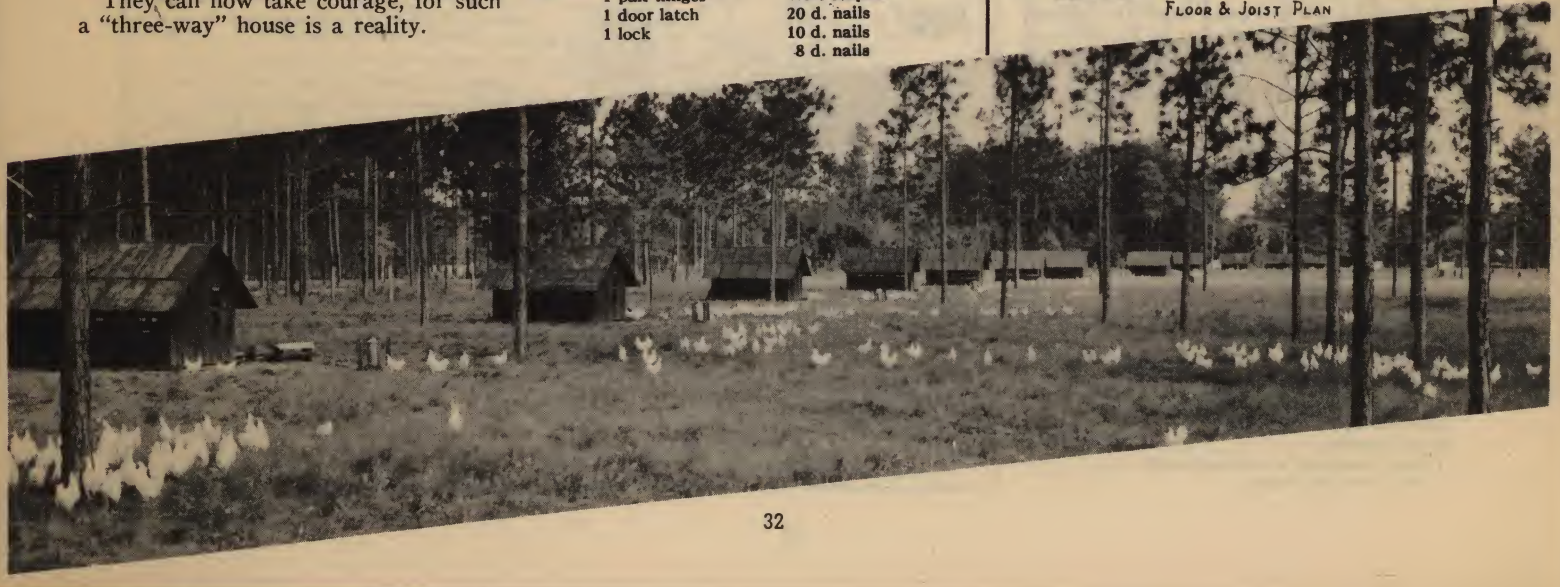
END ELEVATION & SECTIONS.



SIDE ELEV. & SECT.



FLOOR & JOIST PLAN



Pinebreeze Farm, Fla., one of the nation's leading poultry breeding establishments, has solved effectively the problem of obtaining houses and equipment at low cost, where it is necessary to rotate ranges to avoid losses from parasites. They have designed a portable, all-purpose house which can be used as a brooder house, range house and laying house, and can be moved from one place to another.

This type house, now in general use in northeastern Florida, is popular on large farms with 2,000 or more birds and is nearly ideal for small farms, says D. F. Sowell, extension poultryman with the University of Florida. It helps hold equipment cost to a minimum.

Here is the way Sowell pictures the layout. The house is 10 ft. wide and 12 ft. long. It is built on cypress skids and has a galvanized iron roof. Rough lumber can be used for the framing and walls, and No. 2 pine for the floors. The even-span roof extends two feet over the eaves, preventing rain from blowing in at the sides, which are open for a depth of 28 inches the full length of the house. The top half of the door is open and there is also a gable ventilator 1 x 2 ft. on the rear of the house.

When used as a brooder house, insulating board is nailed along the walls and along the slant of the rafters. The side walls of the house are made just right to take insulating board 4 ft. wide. The door and rear ventilator are covered with muslin. The soft light that penetrates the muslin is ideal for brooding. It enables the chicks to find feed and water without encouraging cannibalism. Chicks should be given access to a limited yard around the door by the time they are two weeks old. As soon as they learn how to get in and out of the house, they are given free range.

Right Size for Brooder Unit

When properly insulated and ventilated, the house makes a good brooder unit. The old type 5-inch blue flame brooder stove with a 52-inch hover has been used with satisfaction for brooding 250 chicks at the University of Florida poultry farm and at the West Central Florida Experiment Station near Brooksville. The house will carry as many as 400 chicks, but a larger stove is necessary for heating if more than 250 are brooded at one time.

When the chicks become large enough to go without heat, the stove and insulating boards are removed and stored until the next brooding season. Roosts are put in, and the house is transformed into an ideal range shelter. The door being off center gives sufficient room for the roosts at one side. The roosts are built in two sections of four perches each, 5 ft. 9 in. long. They are nailed to 1 x 10-inch boards on 12-inch centers. The 10-inch boards are on edge, making the roosts 10 inches off the floor. Poultry netting is tacked underneath the roosts to aid in sanitation.

When fixed in this way the house can be used for growing stock and laying hens. The perches being low, it is easy to teach the chicks to roost at an early age, avoiding crowding and consequent respiratory diseases.

Add Nests for Layers

As the birds come into production, nests are placed outside along the wall opposite the roost. They open inside, and run boards provide easy entrance for the birds.

Feed hoppers 4 ft. long are used because of ease in handling. One hopper is placed inside the house and three outside. A 5-gallon double wall fountain placed on a frame is used for water.

Harold and Lawrence Irvin, who designed the house, say a brood of 250 "straight run" chicks can be raised, the pullets grown to maturity and housed in this all-purpose house for two laying years. After the second laying year, the house will be available again for chicks. To start a new brood of chicks each spring, it will be necessary to have three houses. If layers are sold at the end of the first laying year, only two houses will be required.

The first, second and third houses should be built and ready for chicks by March of each of three successive years. By then a complete unit will have been built, and the poultry project can be carried on indefinitely without interruption. The building will be spread over a three-year period, with no large construction cost at any one time. A three-house unit will care for 170 layers and one house will always be available for growing young stock.

Frequent Moving Recommended

When more than one house is used, they are placed 100 ft. apart in rows 200 ft. apart. The feed hoppers and water fountain are moved to a different side of the house each week. At the end of the fourth week, when they have completely circled the house, the house is moved 40 ft. to a new location. In this way the soil is kept reasonably free of contamination, and it is possible to maintain a good sod, which supplies valuable green feed for the birds.

The land requirement for each house is figured at 1½ acres, divided into three plots of one-half acre each to provide for a three-year rotation. If 10 houses are in use, three plots of five acres each are necessary. To separate the pullets from the hens the 5-acre plots are sub-divided. The plots in use for poultry should be planted in pasture or grazing crops, the ones being rested can be used for grazing cattle or growing field crops.

The cost of each house will range from $35 to $50, depending upon cost of building materials. It is easily constructed and can be built by anyone possessing a slight degree of skill with saw and hammer.

This unit was born of the necessity to control diseases. Its low cost and diversity of uses has put it on many of Florida's most successful and prosperous poultry farms.

Plan For Feed Storage Bin

It is the labor-saving devices that often spell the difference between profit and loss in the poultry game these days. This bin in my brooder house not only saves much labor, but patience as well. I always know where everything is pertaining to the brooding business. There is no loss of time hunting for things. There is no spilled grain to sweep up. The very neatness of the room appeals to visitors, and after all, their opinion counts a lot.

This bin is situated only a few feet away from my battery in my battery room and also near the swinging doors which enter my large brooding rooms.

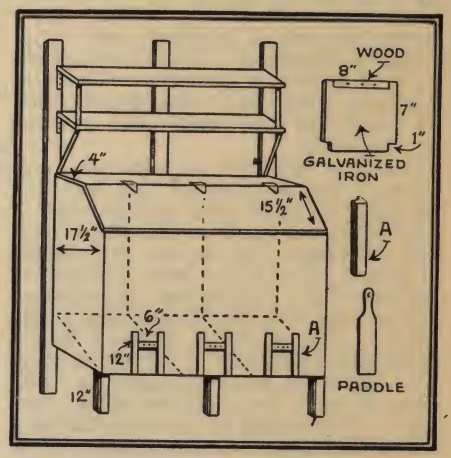
It is made of the best matched pine. It has three divisions. Others may have as many as they like, but my wall space only allowed for three. Aside from nails and screws, three hinges and six shelf brackets are needed. The sliding gates are made of galvanized iron and the bottom of the bin is lined with it.

In using galvanized iron, I always insist on edges being tightly single seamed so there will be no cut fingers, and, besides, the appearance of the job is much neater. The bottom of the bin is built sloping toward the sliding gates. The sloping parts are lined with galvanized iron so the grain will slide freely. The dotted lines in the illustration show, as nearly as I can draw them, how the bottom is built.

A wooden paddle as shown is always hanging on a hook beside the bin. Occasionally the mash clogs and the paddle is always handy to poke it down.

The sliding galvanized iron gates are made as illustrated, all edges single seamed. The block of wood on the top serves as a handle. The gates slide along pieces "A" which are slightly grooved on the inside as shown.

The bin is high enough from the floor to permit pails to slide under. I like the small coal hods the best for filling battery pans and small chick feeders. The time saved in dipping grain alone is surprisingly great, as it takes only a matter of seconds to fill pails from this bin.



A bin arrangement, such as this, proves to be a time and labor saver.

All tools needed in the brooding business, such as small hammer, special wrenches, pliers, and I find a pair of kitchen shears useful in many ways, are either on the shelves in their allotted places or on hooks. Labeled boxes containing various sizes of nails, screws, nuts, etc., are on the shelves. I like glass containers best. On a farm there are many such glass jars of various sizes that can be used as well as not.

A catching hook is hung beside the bin, too.

All remedies and disinfectants have their respective places. In other words, this little corner seems to be a place for everything. It has paid for itself many times in time and patience saved.—*Ellen G. Akers, Me.*

What Wire Under Roosts?

What is the best wire to place under roosts to prevent the eggs from falling through? We have dropping pits 18 inches deep and two inch mesh poultry netting under the roosts. Any eggs laid during the night on the roosts drop through, and it is very inconvenient to get them.

Answer: Probably the best wire to have under roosts for use on droppings boards or droppings pits is either 1" x 2" or 1" x 4" welded wire fabric, or either a 12½ or 14 gauge material. Probably the next best is the 1½" mesh octagonal netting of a heavy gauge. A light wire doesn't last long under roosts.

A Hen Battery House

Designed especially for the use of laying cages, it has a capacity of 504 hens.

ONE of the merits of hen batteries is the efficiency of caring for the birds. Frequently, much of this efficiency is lost when hen batteries are installed in a poorly arranged house. A hen battery house should be compact, yet enough space allowed for conveniently working around the batteries. Other factors to be considered are the storage of feed, handling of eggs and the disposal of the droppings. Labor requirements under the battery system should be kept at a minimum. In any poultry enterprise, the cost of buildings and equipment is important. These costs should be kept as low as possible, without increasing labor and management costs, or sacrificing the health and comfort of the birds.

Factors such as compactness, conveience, and the storage and handling of supplies, have been incorporated in the house described in the accompanying drawings. In so far as possible, a proper balance has been maintained between these factors and construction costs. The capacity of the house is 504 layers. The house is planned to accommodate batteries of 72 layers each. The batteries have 12 cages on each side of each tier and are three tiers high. This seems to be somewhat of a standard unit among the manufacturers of laying battery equipment. The house may be built of any length, depending on the capacity wanted. Each seven feet added to the length will add 144 layers to the total capacity of the house. If desired, separate buildings may be constructed for increased capacity. Because of disease and fire hazards, probably a maximum of 1,000 layers in one building would be the most desirable.

In cold climates, it is necessary to maintain an inside temperature of approximately 65 degrees Fahrenheit during the winter months. This can be accomplished efficiently by insulating the house and installing a hot water heating system as shown in the plans. Heat is supplied by a series of pipes along the side and end walls about 2½ feet from the floor. It is necessary to have two separate circulating systems because of the interference of the entrance doors.

Under the battery system of hen management, where a large number of birds are housed in a relatively small space, ventilation becomes an important factor. A continuous, rigidly controlled flow of air without drafts striking the birds is essential. To accomplish this in a hen battery house, it is necessary to use a forced draft system of ventilation similar to the one shown. The system is simple and can be installed at a reasonable cost. The air is removed at the center of the house by means of a sixteen-inch three-speed fan. A fan having three speeds is desirable in order to control the amount of air expelled. The fan is connected to a vertical flue extending through the roof. The top of the flue is covered with a ventilating cone. To prevent the condensation of moisture occurring within the flue, it should be well insulated.

Air is brought in at the two end windows on each side of the building. By means of a wooden duct, of the same width as the window, the air is taken to the floor. (See cross section drawing of window for details of this construction.) A four inch door at the floor permits control of the flow of air. Approximately three feet of the heating pipes are inclosed within the air intake duct. During cold weather, the incoming air in passing over these pipes is tempered and enters the room at a higher temperature than it would otherwise. The center windows on the sides and the windows on each end of the building can be used for additional ventilation when necessary. These windows are hinged at the bottom. The sides of all windows are equipped with galvanized iron shields to prevent drafts from striking the birds.

The walls and ceiling of the house are insulated with three-quarter inch insulating board. The insulating material is placed on the outside of the studs, underneath the weather boarding. A layer of waterproof building paper is placed between the insulating board and weather boarding. This type of construction does not give a smooth wall on the inside of the house, but it does eliminate many ideal harboring places for rodents. The air space between studs, when both sides are lined, has practically no insulating value.

Better conditions of sanitation can be maintained and a saving of labor effected, if the floor of a hen battery house can be washed out with a hose. From this standpoint, a concrete floor is preferable. The floor has a slope of ⅛ of an inch to the foot, towards the drain located in the center of the building. To protect the framework against decay, due to the frequent use of water in cleaning, the foundation wall is extended two feet above the floor. The roof has sufficient pitch to permit the use of almost any type of roofing material. It also gives a convenient height to the feed storage room. Bins should be built in the feed storage room for the storing of grain and mash. The feed is conveyed from the bins to the first floor by means of chutes. A part of the feed storage room can be utilized for the storing of equipment. chicken crates, egg cases and other supplies.

Many poultry raisers, large and small, are interested in using laying cages because of their advantages in disease control, automatic trapnesting, and the smaller amount of land required. The special housing requirements are given in the accompanying article.

BILL OF MATERIALS

Hen Battery House

Size 32' by 32' **Capacity 504 Layers**

No. or Amt.	Required	Size and Length Purpose
8	2"x8"x16'	Sills
16	2"x8"x16'	Girder for support of roof and feed room floor
2	2"x8"x14'	Stair horses
2	2"x8"x12'	Stair horses
17	2"x8"x10'	Floor joists of feed storage room
38 or 57	2"x6"x20' or 2"x6"x14'	Roof rafters
2	2"x6"x12'	Stair landing
24	2"x4"x16'	Wall plates
20	2"x4"x16'	First floor partitions studs, etc.
14	2"x4"x14'	Second floor outside wall studs
35	2"x4"x12'	First floor outside wall studs
34	2"x4"x12'	Ceiling rafters
14	2"x4"x12'	Feed room partition studs
7	2"x4"x12'	Window and door headers
3	1"x8"x12'	Ridge board
4	1"x8"x10'	Sides of air intake ducts
10	1"x6"x12'	Window sills, feed chutes, etc.
4	1"x4"x14'	Corner strips
14	1"x4"x12'	Window trim
9	1"x8"x12'	Window trim
8	1"x8"x10'	Facing under eaves of roof
6	1½"x10"x12"	Stair treads
3,000 bd. ft.	5¼" tongue and grooved sheathing	Roof, partition lining, feed bins, etc.
500 bd. ft.	2½" flooring	Feed room floor and stair landing
1,300 bd. ft.	5½" siding	Weather boarding
2,000 sq. ft.	¾" insulating board	Insulation of walls and ceiling
2	4"x8'6" steel columns	Support of girder
1	3"x9'4" angle iron	Reinforcement of floor over boiler room at stairs
2	3'0"x7'0"	Outside doors, upper ½ glass, and frames
1	3'0"x6'0"	Outside doors, upper ½ glass, and frames
3	2'6"x6'6"	Inside doors
11	2'11"x3'1"	Barn window sash, 6 lights size 10"x16"
13 squares	Roofing material (either roll or sheet steel roofing may be used. See your dealer).	
1 roll	Tarred building paper or sisal paper	
1	Ventilating fan size 16"	
1	Ventilating cone	
1	Hot water heating system	
10	Electric lights and necessary wiring and fixtures	
2	Floor drains	
	Hardware, nails, paint, plumbing, etc.	

Foundation

258*	Rock-faced concrete blocks size 8"x8"x16"
12*	Rock-faced concrete corner blocks size 8"x8"x16"
416*	Plain-faced concrete blocks size 8"x8"x16"

*Quantities required will depend on existing ground levels

Floors, Footing Course and Chimney

110	Sacks of cement
260	Cubic feet of fine aggregates
325	Cubic feet coarse aggregates
550	Common brick
8	Cubic feet of lime

Alternate for Sheet Steel Roofing and Siding

Omit 1200 bd. ft. tongue and grooved sheathing and 1300 bd. ft. of siding. Add the following:
Roofing 13 squares
34 pieces 10' length, 34 pieces 9'
4 10' lengths copper bearing 28 gauge ridge roll, 14" girth
Siding Sides, each, 16 pieces 7' length
Ends, each, 16 pieces 7' length, 8 pieces 7' length (cut)
Nails 40 lbs. 2" screw drive, lead head, galvanized

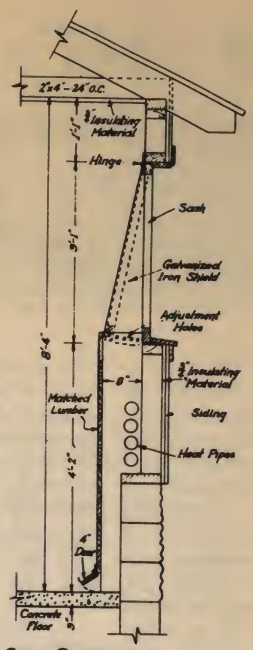
32' × 32' HEN BATTERY HOUSE

ESPECIALLY DRAWN AND ASSEMBLED FOR

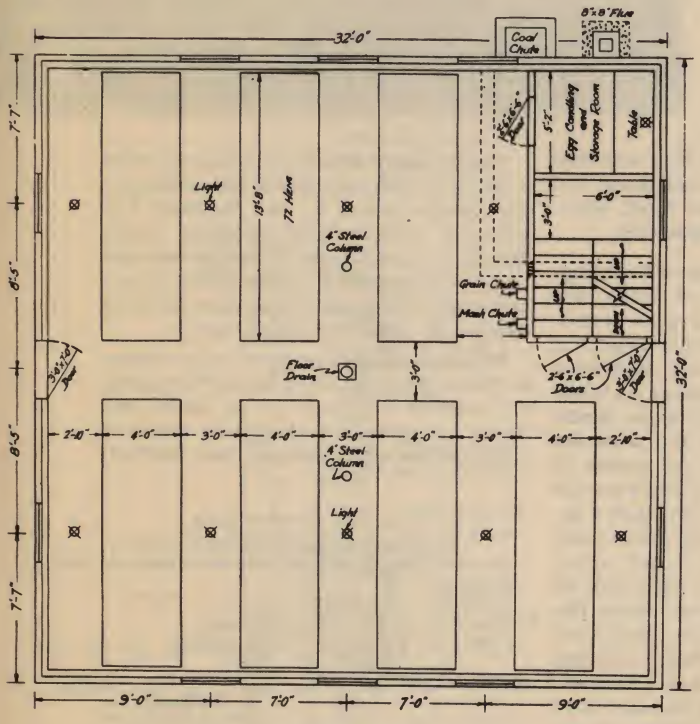
POULTRY TRIBUNE,

MOUNT MORRIS, ILLINOIS

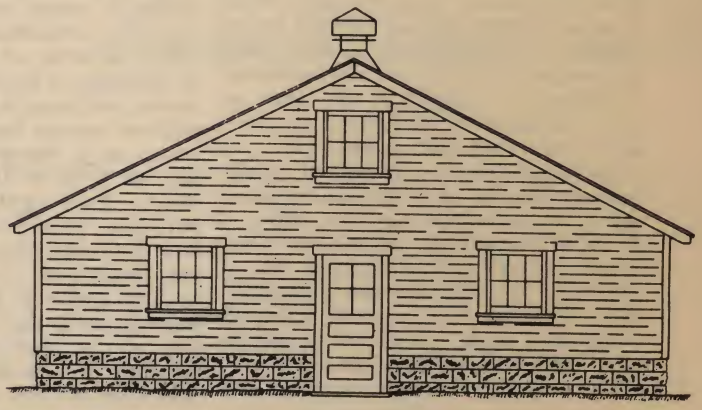
BY PA. STATE COLLEGE.



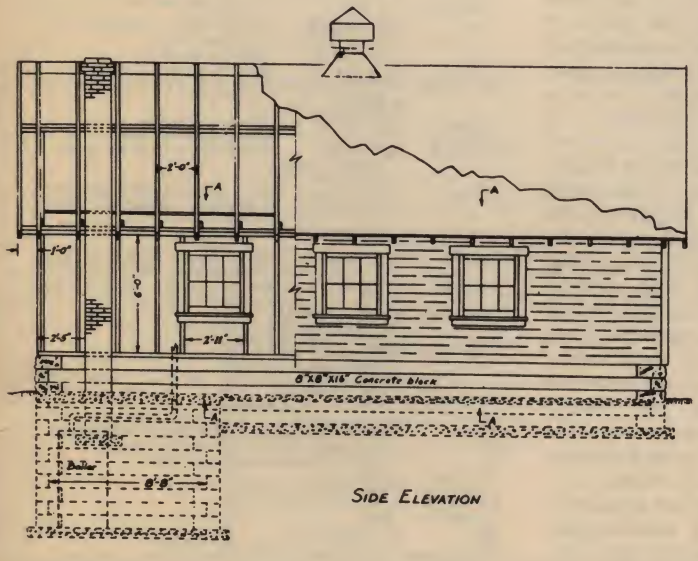
CROSS SECTION A-A OF WINDOW



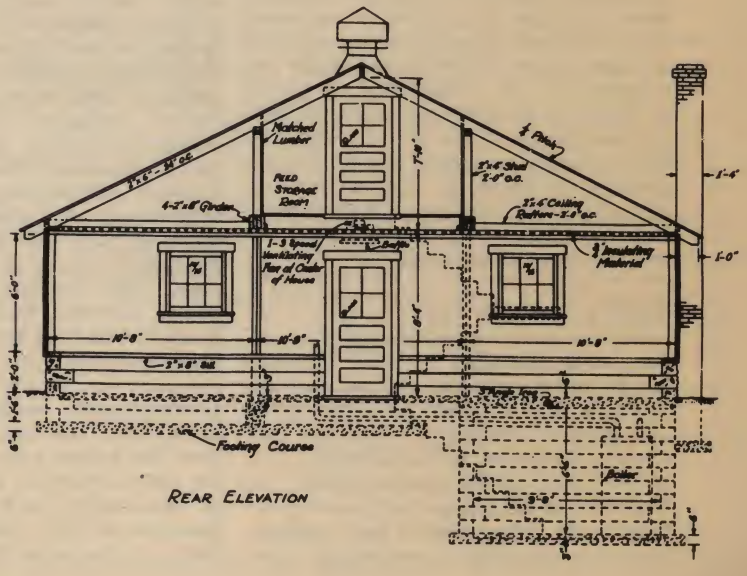
FLOOR PLAN



FRONT ELEVATION



SIDE ELEVATION



REAR ELEVATION

BATTERY HOUSE

For Starting and Growing 250 Broilers a Week

WITHIN recent years, the use of batteries for starting and raising chickens has become a common practice. This has created a need for poultry houses especially adapted for use with batteries. Because of this need, Poultry Tribune arranged with R. R. Murphy, Pennsylvania State College, to provide the plans for a 24'x32' house presented here. Construction details and sizes of battery equipment vary considerably with different manufacturers. For this reason, it is recommended that those wishing to build new houses should first consult the manufacturer of the equipment to be used to determine if changes in the house construction should be made to accommodate his equipment.—ED.

SUCCESS with raising chickens in batteries depends, to a large extent, upon the building accommodating the battery equipment. The 24 by 32 ft. starting and growing battery house described in the accompanying drawings will accommodate a sufficient amount of equipment for the production of approximately 250 2-lb. broilers each week. The house may be built 32, 64, 96 or 128 ft. long, depending upon the capacity wanted, or added to as additional space is required. Each 32 ft. unit added increases the capacity sufficiently to produce an additional 250 broilers each week.

The foundation wall is constructed out of 8 by 8 by 16 in. concrete blocks. As a base for the blocks, a 4 in. footing course is recommended. The footing course provides a level surface for the blocks and increases the bearing surface of the foundation. It should be constructed out of concrete consisting of one part cement, two and three-quarter parts clean, sharp sand, and four parts gravel. To protect the framework against decay, the foundation wall is extended two feet above the floor. The sill and studs, if extended to the floor, would soon deteriorate, because of the frequent use of water for cleaning the floor and maintaining the proper degree of humidity within the house. The sill should be bolted firmly to the foundation wall.

The floor of the house is concrete and is sloped towards a drain located at the center of the growing room. A slope of approximately one-eighth inch to the foot is sufficient. For constructing the concrete floor, 2 by 4 in. forms should be used to give uniform thickness to the slab and to permit leveling the concrete with a straight edge. The use of forms and a straight edge eliminates any low or high places in the floor. After the concrete has set sufficiently, it should be surfaced with a steel float. A mixture consisting of one part cement, two and a quarter parts sand and three parts gravel is satisfactory. If a medium size gravel is used, a smooth, hard surface can be obtained without applying a top coating of sand and cement.

Building Must Be Tight

For economy and efficiency of operation, it is desirable to have batteries housed in an insulated building. Insulation not only reduces fuel costs but it also provides conditions which are conducive to rapid growth and development of the birds during warm weather. As indicated on the plans, the house is insulated with three-quarter inch asphalt-coated board-form of insulating material attached to the outside edge of the wall studs and roof rafters. If an asphalt-coated board is not used, a waterproofed building paper should be placed between the insulating material and the weather boarding.

If a smooth wall is desired on the inside, the walls and roof can be lined with five and a half inch matched lumber and the space between studs and rafters filled with mineral wool, shavings or some other fill insulation.

Under the battery system of brooding, where a large number of birds are housed in a relatively small space, ventilation becomes an important factor. It is desirable to have a rigidly controlled flow of air through the house at all times without having drafts strike the birds. Fresh air is brought in at the windows and conveyed to the floor by means of wooden ducts of the same width as the windows. To eliminate drafts, each window should be equipped with galvanized iron shields or wings. If a hot water heating system is used, the pipes can be located along the walls just above the top of the foundation and extended through the air intake ducts. During cold weather, the incoming air in passing over these pipes is tempered and enters the room at a higher temperature than it would otherwise. Air is removed at the center of the building through a ventilating cone equipped with an electric fan, and at each end through a louver. Each louver should be equipped with an adjustable door. The primary purpose of the fan is to aid in ventilating the building during warm weather, particularly when the movement of air outside is negligible. The experience of numerous battery operators indicates that ample space above batteries is particularly advantageous in maintaining satisfactory atmospheric conditions for the birds. For this reason, the plans do not call for a ceiling above the growing room. The starting and feed storage rooms, however, have a ceiling placed seven feet and six inches above the floor. For economical operation of the starting batteries and to provide more suitable environmental conditions for young chicks, the starting room is separate from the growing room. A 24 by 24 in. air outlet equipped with a sliding door for controlling the flow of air should be installed in the ceiling of the starting room at the point shown on the plan.

The building should be equipped with a suitable heating system for maintaining temperatures in the starting and growing rooms. The starting room should be kept at a temperature between 70 and 75 degrees F., while in the growing room a temperature of from 55 to 60 degrees F. should be maintained.

Electric lights equipped with shades to throw the light down should be placed at frequent intervals in all aisles between batteries and along side walls at points where windows have been omitted.

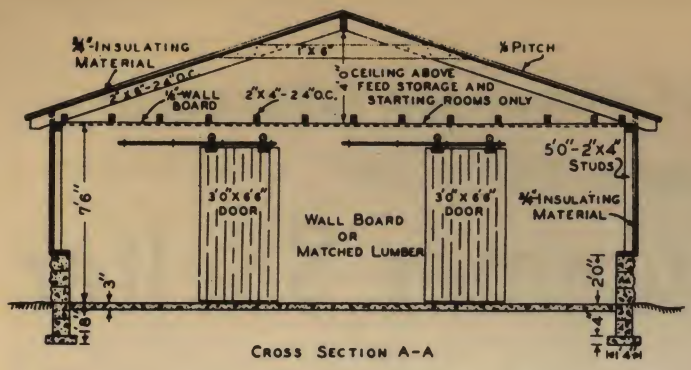
BILL OF MATERIALS

For Starting and Growing Battery House

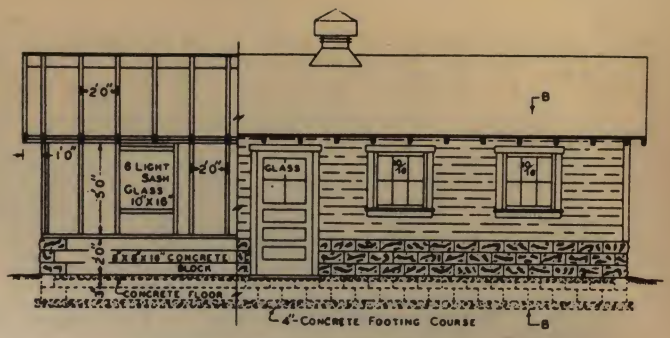
(Size 24'0"x32'0"—Capacity approximately 250 broilers per week)

No. or Amt. Required	Size and Length	Purpose
7	2" x 8" x 16'	Sills
38	2" x 6" x 14'	Roof rafters
11	2" x 4" x 16'	End wall studs
14	2" x 4" x 14'	Partition studs and side wall plates
30	2" x 4" x 12'	Ceiling rafters above feed storage and starting rooms, window and door headers and inside partition plates
28	2" x 4" x 10'	Side wall studs and plates
3	1" x 8" x 12'	Ridge board
6	1" x 8" x 12'	Sides of air intake ducts at windows
6	1" x 6" x 12'	Louvers in gable ends and inside door battens
15	1" x 6" x 10'	Ties across roof rafters
5	1" x 6" x 8'	Window sills
18	1" x 4" x 12'	Outside window trim, corner strips and ventilating doors at windows
4	1" x 3" x 14'	Facing under overhang of roof at gable ends
2	1" x 3" x 12'	Trim for louvers
5	1" x 3" x 8'	Outside window aprons
1,400 bd. ft.	5¼" tongue and grooved sheathing	Roof and air intake ducts at windows
800 bd. ft.	5½" siding	Weather boarding
80 bd. ft.	2½" flooring	Inside partition doors
1,500 sq. ft.	¾" asphalt coated insulating board	Insulation of walls and roof
475 sq. ft.	½" wall board	Inside partition walls and ceiling over feed storage and starting rooms
2	1¾"x3'0"x7'0"	Outside doors and frames (upper ½ glass)
10	2'11"x3'1"	Barn window sashes, 6 lights, size of glass 10"x16"
10 pair	9"x36"	Galvanized iron wings for windows
10 squares	Roofing material	
1	Ventilating cone equipped with 16" fan	
1	Suitable heating system	
1	Bell type 12" floor drain and 4" terra cotta soil line to disposal plant.	
	Electric fixtures, wiring, hardware, nails, paint, plumbing, etc.	
	Foundation	
222*	Rock-faced concrete blocks size 8"x8"x16"	
12*	Rock-faced concrete corner blocks size 8"x8"x16"	
164*	Plain faced concrete blocks size 8"x8"x16"	
	Floor, Footing Course and Flue	
55 Sacks	Cement	
140 cu. ft.	Fine aggregates (sand)	
160 cu. ft.	Coarse aggregates (gravel)	
5 cu. ft.	Lime	
500	Common brick	
14 ft.	Eight-inch terra cotta flue lining	

*Quantities required will depend upon contour of ground.

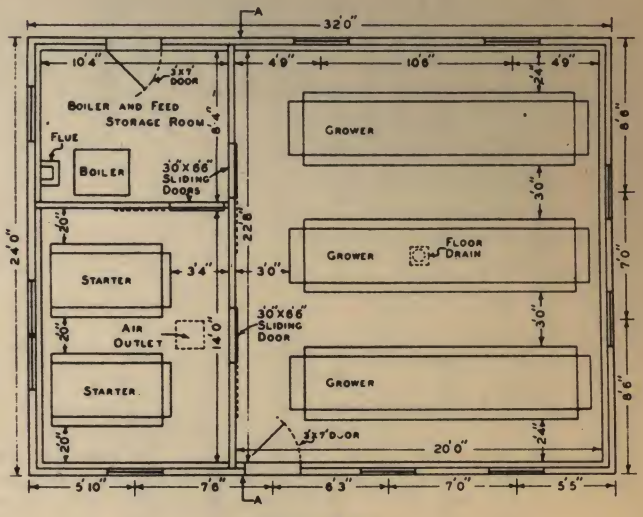


CROSS SECTION A-A

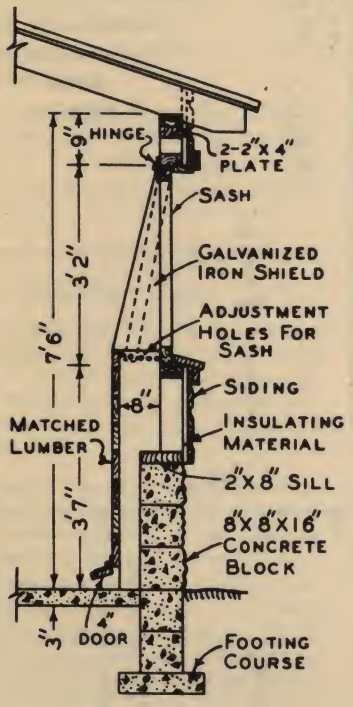


FRONT ELEVATION

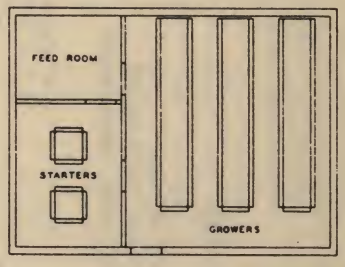
END ELEVATION

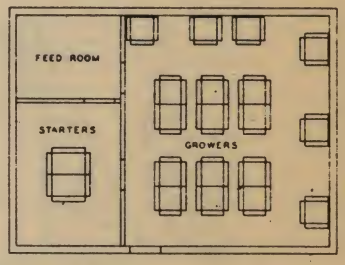


FLOOR PLAN

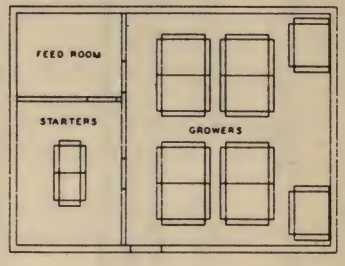


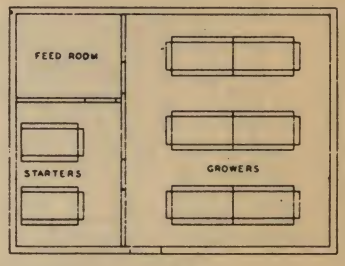
CROSS SECTION B-B OF WINDOW



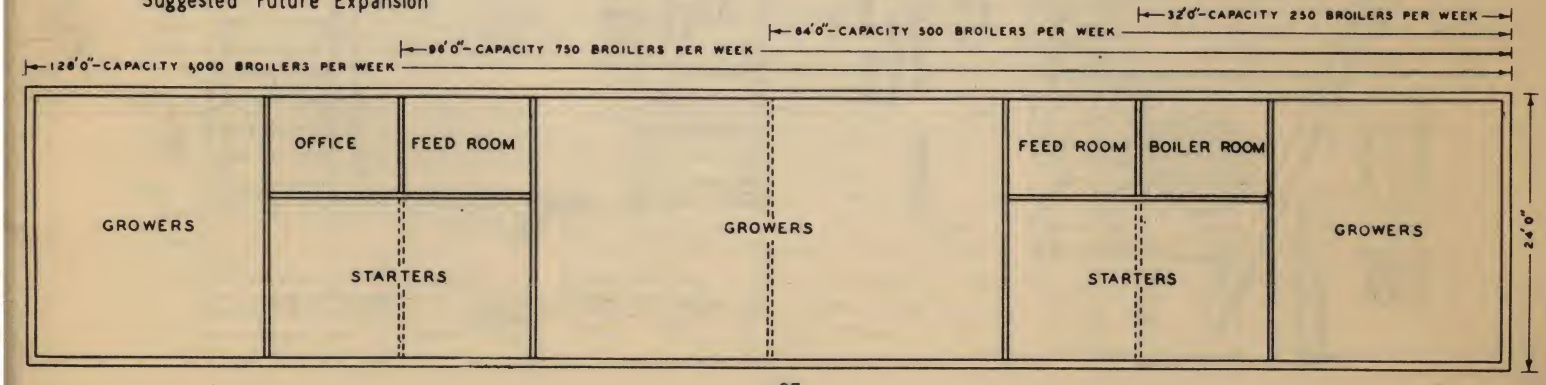


Suggested Arrangements for Various Types of Batteries
(SIZE OF BUILDING 24'0"x32'0"-CAPACITY APPROXIMATELY 250 BROILERS PER WEEK)





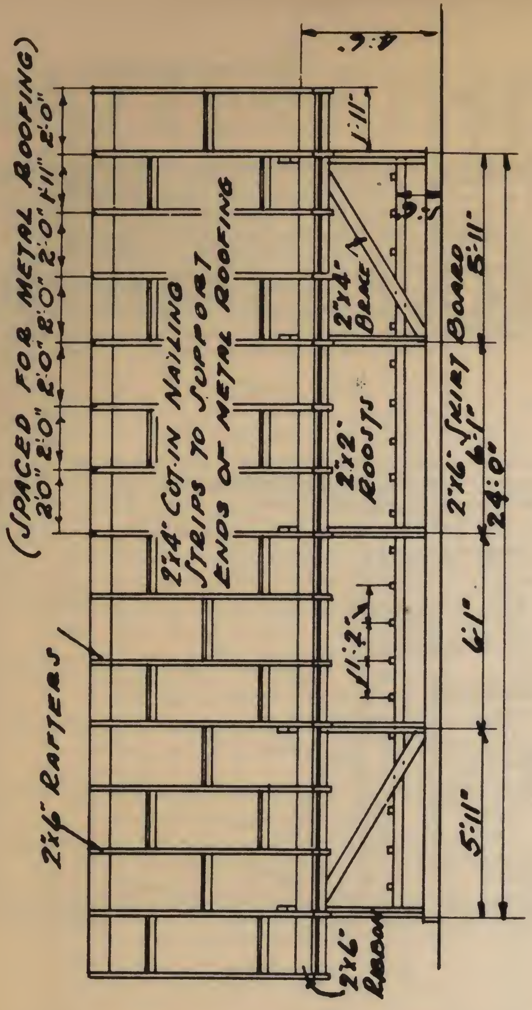
Suggested Future Expansion



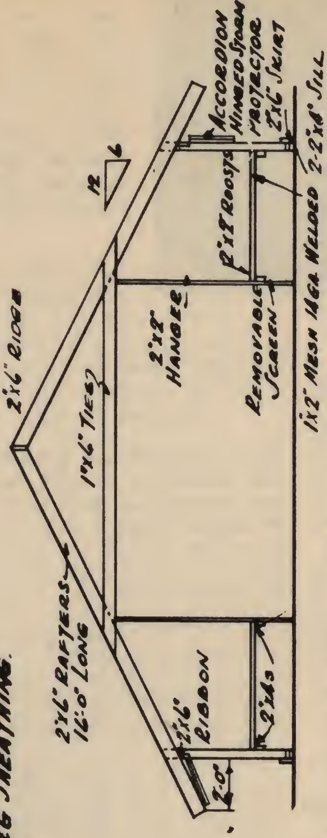
For Increased Efficiency

Add a 24′ x 24′

Summer Shelter



SIDE FRAMING ELEVATION



CROSS SECTION

SCALE 1/4"=1'0"

For Laying Hens

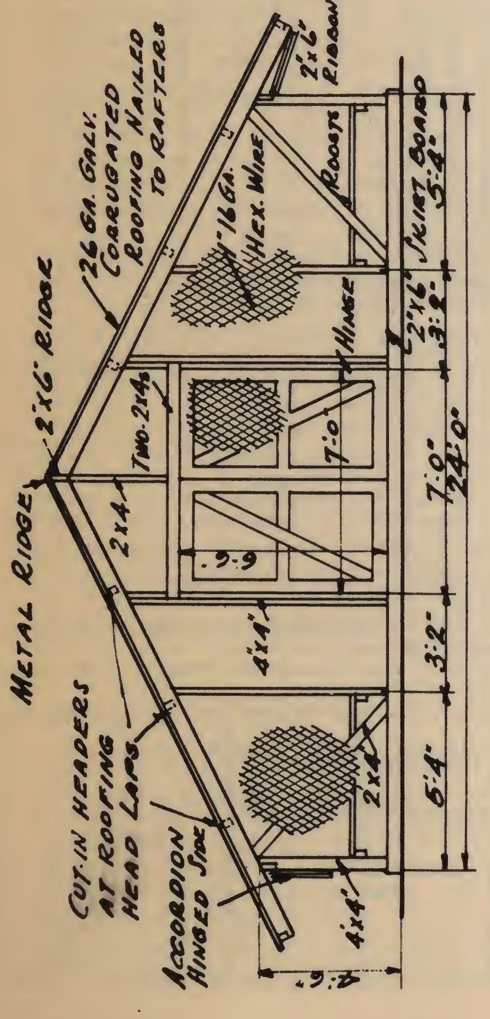
Fall Hatched Chicks

Emergency Housing

Summer Capacity

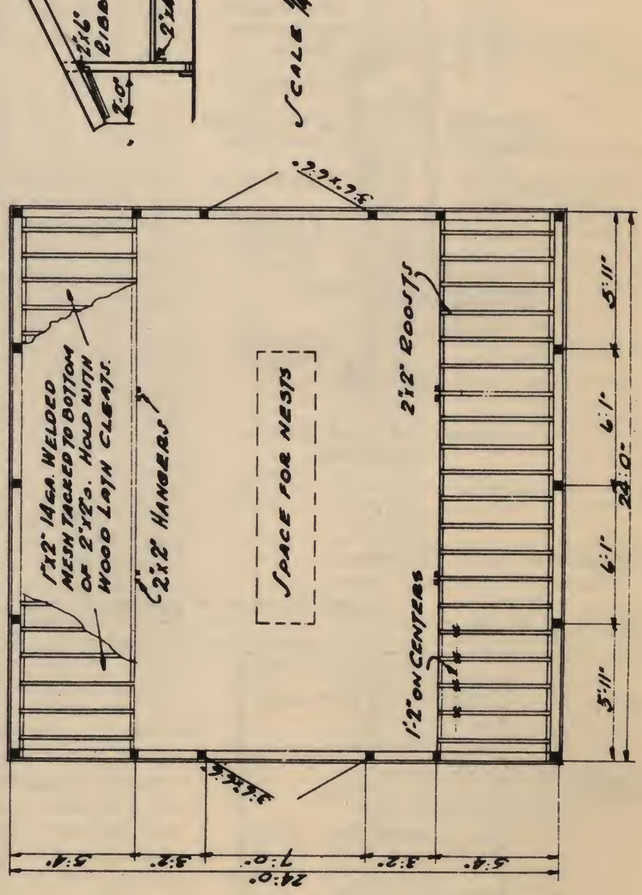
300-350 Laying Hens

Adapted From Plans Developed at Massachusetts State College

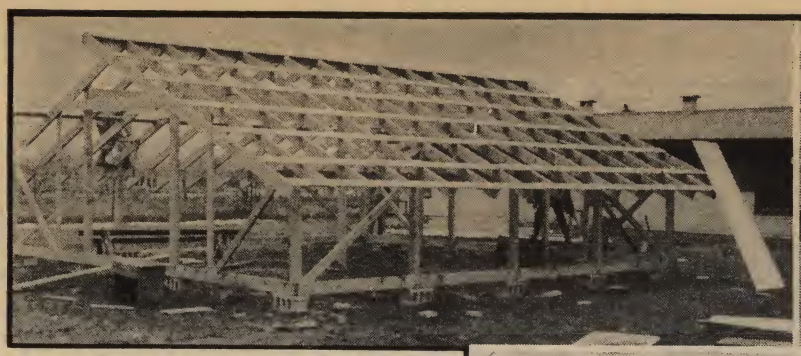


FRONT ELEVATION

NOTE: IF ROLL ROOFING IS SUBSTITUTED FOR METAL ROOFING OMIT 2"x4" CUT-IN HEADERS AND BOARD THE ENTIRE ROOF WITH T&G SHEATHING.



FLOOR PLAN



Framing completed on one side of hen shelte built at Poultry Tribune Experimental Farm

UPPER RIGHT—Shelter with roof partially completed. ABOVE—Completed shelter. Because this shelter was wanted for year-round use, it was completely enclosed with drop siding. For summer use, the doors will be fitted with frames of wire netting, and on each side the two top boards are hinged at the top so they can be hooked up against the rafters, allowing more ventilation. In milder climates or when the shelter is not to be used in winter, all four sides may be covered with hexagonal netting.

THE EFFICIENT poultryman is constantly trying to improve his business. He will seek to increase production while reducing overhead and operating costs. By so doing, he is better equipped to meet competition and changing economic conditions without loss.

No two farms will be able to improve efficiency and production in the same manner. However, they usually work out their management problems by one of the following methods.

1. By keeping the plant operating at a greater percentage of capacity throughout the year. This will be accomplished, in part, through the use of fall and winter hatches.

Summer Shelter Uses

There are many uses that can be made of summer shelters, so it is little wonder that poultrymen who have them classify them as practically indispensable in efficiently managing a poultry farm. The following uses are made of them.

1. **For housing layers during the summer to make room for the new crop of pullets, thus allowing ample time for cleaning and disinfecting the regular laying house. This use will give 2½ to 3 months of extra production out of a flock of well-bred layers. The housing expense can be as low as 25 cents a layer by building with used or cheap material. It should not go over $1 a bird.**
2. **For housing January hatched pullets. This shelter might be a lean-to constructed in connection with some other building. These pullets should be held as long as they produce profitably, then sold or molted and held for the production of hatching eggs. Such a method has great possibilities in increasing the output of the plant for defense needs.**
3. **For housing fall hatched pullets, giving cheap housing space and just as high production as more expensive buildings.**
4. **For housing 6- to 8-week-old chicks if equipped with some kind of a stove and boarded in.**
5. **For holding over breeding males.**
6. **For emergency housing at any time of the year and for many classes of poultry.**

2. By feeding, housing, managing, and lighting for a greater lay throughout the year.

3. By raising 10 to 15 percent extra pullets to be sold to those who do not have time or facilities to raise pullets but who can keep them for egg production.

4. By raising some extra pullets and housing them in temporary shelters or summer laying houses.

These temporary sheds and summer laying shelters have increased in popularity among poultrymen. At a low building cost per bird housed, the summer shelter provides housing for young and old birds alike.

This shelter is recommended for the consideration of poultrymen everywhere.

Laying Years Overlap

A quarter century ago the overlapping of the laying years was noted at Massachusetts State College. Hens bred for 12 to 15 months of continuous production were nowhere near ready to complete their year when the new crop of pullets was ready for housing. They needed some kind of a shelter where they could be moved in the early summer to complete their laying year. Summer egg prices in New England have long been too high to lose the eggs that these birds are capable of laying.

This interior view shows November hatched pullets in the shelter in February. In this shelter the floor consists of about 10 inches of cinders covered with litter. Many details of construction can be altered to suit the needs and finances of the builder. (PT Farm Photos)

The first of the shelters were 20 by 20 ft., with high sides, inexpensively constructed, but they served the purpose very well. They were built on lots near the laying houses, and the land was seeded to rye, wheat or some other suitable crop each year after the birds were taken off. These houses do not give the protection to the flock that one with a lower roof gives; but production in them has been good and they have paid for themselves many times in summer and fall eggs from the hen flocks.

As draftsmen and poultrymen took the idea and began to improve it, the building became a 24 x 24 ft. shelter with a low A-roof that gives more protection from sun, storms and wind and at the same time permits abundant ventilation. It unfortunately has become more expensive to build. The shelter houses 300 to 350 layers.

The roof is usually carried on 2 by 6 rafters to withstand the heavy weight of snow that it must frequently carry in New England. The rafters are spaced 3 ft. apart for boards covered with roofing paper, or 2 ft. apart for metal. When the roofing paper is used it is nailed over matched roofers to prevent as much of

BILL OF MATERIALS

For 24x24 ft. Summer Laying Shelter

Lumber:—		
Skirt	8—2" x 6"—12'	
Sill	8—2" x 4"— 8'	
	8—2" x 4"—16'	
Posts	9—4" x 4"— 9'	
	2—2" x 4"—14'	
	1—2" x 4"— 8'	
Header	4—2" x 4"— 8'	
Ribbon,	4—2" x 6"—14'	
Ridge	2—2" x 6"—14'	
Rafters	30—2" x 6"—16'	
Rafter ties	4—1" x 6"—16'	
Nailing strips	8—2" x 4"—10'	
Fascia	4—2" x 4"—14'	
Braces	4—2" x 4"—14'	
Roost Supports	4—2" x 4"—16'	
	4—2" x 4"— 8'	
Roosts	20—2" x 2"—10'	
Doors	8—1" x 4"—10'	
Door braces	2—1" x 4"—14'	
Storm protectors	250 bd. ft. 1" x 4" T & G boards	
Roofing:—		
	28 sheets— 96" long	
(1¼" Eastern Corrugation)	28 sheets—108" long	
Hardware:—		
Netting		
Sides—1" 16 ga. Hex	48 ft.—48" wide	
Ends —1" 16 ga. Hex	16 ft.—48" wide	
	48 ft.—60" wide	
	64 ft.—36" wide	
Doors	24 ft.—36" wide	
Pits—1½" 16 ga. Hex	48 ft.—60" wide	
	or 1" x 4" welded wire, 12½ ga.	
Roofing nails		
Common nails		
Fence staples		
Hinges	4 pairs—8" "T"	
Hasps	2	

the ripping off of the paper by wind as possible. Metal is more durable and one has the choice of ribbed types, V-crimped, and 1¼" corrugated. The zinc coating is very important because upon this depends the length of time that it will remain rust-free. The usual coating on galvanized sheets is about 1¼ ozs. to the square foot. The 2-oz. coating is believed by many to be worth the difference in cost. The metal, however, is the most difficult to obtain now, and one, also, has the choice of shingles and boards of different kinds for the roof.

The sides and ends of the shelter are enclosed with wire netting. At some

This was the first summer laying shelter built at Mass. State College a quarter century ago. Some poultrymen may be able to convert old buildings or lean-tos already on the farm into shelters.

additional expense, folding sections of boards can be hinged or buttoned on the sides and the ends covered with boards, paper, or burlap to make it more comfortable for winter use. By boarding in, this house can be very easily used for year-round production.

Roosts are usually 2- by 3-in. material spaced 14 in. on center and they run the length of the shelter. Droppings boards or pits can be used, but they are not necessary for the droppings can fall into the litter of three inches of sand, straw, or shavings and the house need not be cleaned during the summer.

Two doors, 4 ft. wide, are located in the center of the front of the shelter. The doors should be wide enough for ease in removal of litter to a truck or wagon. The nests are in the center of the room and egg cases placed back to back and two or three tiers high work very satisfactorily.

When summer shelters are used for housing pullets hatched the previous year, the birds should be moved in May or, certainly, no later than early June. There are few poultrymen that report a drop in production and most of them find that it increases after the flock is accustomed to its new quarters. Supplemental feeding of wet mash and pellets is followed usually, though some report that there need be no change in feeding practices from those used in the laying houses. Lights are seldom started until August.

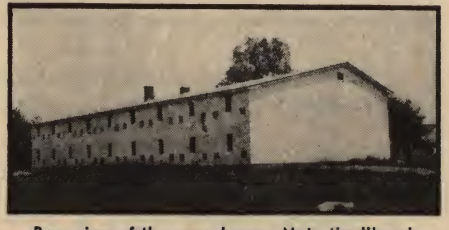
Most of the shelters used in Massachusetts are 24 by 24 ft. in size and they house about 300 to 350 birds. The yards are 1 acre or less and there is a preference for shade; but they seldom have grass. About 60 percent of the houses are closed in with boards or burlap for year-round use. There is no poultryman using one who would not recommend the use of it to others.

Jasper Two-Story House Has Interesting Features

Poultry houses two or more stories high are being used more and more by commercial poultrymen. Such a house completed last year by Grant Jasper, Hudson, N.H., is rather typical of many of these two-story houses, and has a number of interesting features. It was completed in the fall of 1939 and is almost identical with another house completed a year earlier.

It is 108 ft. long and 40 ft. wide. There are eight pens, 24 by 40 ft. in size, with two grain rooms in the center, one on the first floor and one on the second. These grain

Front view of two-story poultry house, 108 ft. long and 40 ft. wide, used by Grant Jasper, Hudson, N.H.



Rear view of the same house. Note the liberal use of windows in the rear to provide light and ventilation.

rooms are 12 by 14 ft. in size, and at the back of each grain room is a laying pen 12 by 26 ft.

The house has every modern convenience for economy and labor and comfort of the hens. There are especially constructed water stands with running water and automatic electric water heaters to warm the water in cold weather, thus encouraging the hens to consume more water. Modern dropping pits are used instead of dropping boards. The nests are so constructed that they can be closed to keep the hens from roosting on them. Mash hoppers hold a week's supply of mash, with 1½ inch mesh wire on top of the feed to prevent waste.

The house has ventilators in both front and back for use in warm months. In the winter, curtains are used in the front of the house, with ventilators at the top and bottom remaining open all of the time. The curtains have several adjustments for various kinds of weather.

The floor slopes six inches from the back to the front to prevent litter from piling up at the back of the house. The ceiling rises six inches from the back to the front to hasten circulation of air from the back of the pen when the hens are roosting. The house is double-walled for greater warmth in winter and coolness in summer.

A House for Hot Climates

A model chicken house for hot climates is shown in the accompanying photo. This one, built in Phoenix, Ariz., is serving its builder well in accommodating a large number of chickens in a well-populated area. Feeding troughs along both sides make laying mash accessible to all the hens. A removable watering trough through the center with a drip valve insures a constantly fresh water supply. Oyster shells and grit are held in other troughs at each end of the house.

Nests for the egg layers are built on the ends of the house. Wire mesh forms the bottom of the nests and when the egg is

This type of house gives good results for an Arizona poultry raiser.

laid a slight incline causes it to roll outside where it can be gathered without disturbing the other layers. A curtain had to be hung on the sides of the nests to keep the chickens from trying to roll the eggs back under them again. This natural instinct of the hen to have an egg under her is partly satisfied by wiring a white painted wooden egg in the bottom of the nest.

The floor of the pen is wire mesh; thus the droppings are easily recovered for use as fertilizer.—*Charles C. Niehuis, Ariz.*

Saved by Soldering

I have made some observations about farms which have been visited lately, and I find that there are quite a few pieces of poultry watering equipment which have been discarded due to the fact that they leak. It is good economy and your patriotic duty to fix these up or have them fixed. Soldering holes is not a hard job to perform. Clean work, hot (not red hot) soldering iron, salamonic block for cleaning and tinning iron, soldering paste and solder, will save a lot of equipment from the discard.

Profitable Insulation

How to Insulate Against Heat and Cold

POULTRY specialists in nearly every state recommend the use of insulation materials to make various poultry buildings more satisfactory quarters for poultry of all ages. The accompanying outline has been prepared to answer most of the questions commonly asked by poultry raisers concerning insulation problems.

I What happens when poultry houses are not properly insulated?

1. Poor ventilation (damp floor and litter, foul smelling air) due to the fact that the interior temperature must be higher than exterior to promote circulation of air.

2. Interior temperature of house varies with outside temperature. Houses are cold in winter and hot in summer.

II Net results of poor insulation.

1. Colds, roup, and bronchitis prevalent in winter, because of poor ventilation and extreme temperature variation.

2. Fowl pox, laryngotracheitis, infectious bronchitis and all other poultry diseases are more common and higher mortality results because of lowered resistance of the flock.

3. Lower egg production in winter due to poor ventilation, extreme temperature variation and disease.

4. Lower egg production in hot summer weather, because of extreme heat which causes birds to be inactive, eat little feed and finally go into an earlier molt than they otherwise would.

A new way to insulate a poultry house. Inch thick insulation board is nailed on the outside of the studding, and then the siding lumber is nailed on the outside of it. With this type of construction, there are no hollow walls to harbor rats and vermin; it is now used generally whenever new poultry houses are built.

The ceiling in the poultry house should not be over 7 ft. high. Both old and new poultry houses should have a false ceiling of insulation board installed at the 7 ft. level. This type of construction makes the poultry house warmer, and at the same time, improves ventilation. Sheets of insulation board, 4 ft. wide, should be nailed to 2x4's spaced two feet apart.

III Does insulation get results?

Missouri man reports results with two flocks, one in insulated house and the other in non-insulated house. Birds in insulated house produced 20 more eggs per bird, resulting in 35 cents more income per hen. The feed cost was 5 percent lower in insulated house. The cost of insulation was less than one-half the additional income received from the birds in the insulated house.

Ohio State University specalists say that proper insulation makes it possible to maintain an inside temperature above freezing even in the coldest weather experienced in Ohio.

Nebraska investigators report that insulated houses will usually range from 25-30 degrees warmer than outside temperature in cold weather and that each hen must lay only four cents worth more eggs in a season to pay the cost of insulating a house.

IV How to insulate.

(a) Roof or ceiling insulation—Roof or ceiling insulation is the most important of all and should be considered before wall insulation.

(1) Reasons for roof insulation.

1. To decrease interchange of heat from inside to outside and vice-versa.
2. To improve ventilation.
3. To decrease the amount of space in houses having high ceilings.

(2) Types of ceiling or roof insulation.

1. Simple roof insulation provided by using insulating board or other material to make roof of double thickness. This should be used in houses having low roofs.

2. Closed false ceiling used in houses having high roofs. Construct false ceiling of insulating board or other material. Straw to a depth of 18-24 inches, or loose commercial insulating materials, can be used *above* false ceiling to provide additional insulation.

3. Open or straw loft type of false ceiling can be constructed by using poultry netting to form ceiling and covering it with 12-18 inches (not more) straw. This improves ventilation. Outlets should be provided for air to get out from *above* the level of the straw.

(b) Wall insulation.

(1) Tough wind-proof and water-proof building paper tacked between the studs (and also rafters, if no other roof insulation is provided) provides a cheap and practical means of improving walls. If funds are available, greater insulation can be obtained by using heavier types of insulating materials.

(2) Rigid insulation board provides one of the easiest and most practical means of insulating poultry houses, and also improves the general structural strength and durability of the house.

1. Methods of using insulating board.

a. In constructing new houses, tack the insulating board to the outside of studding (and also rafters in roof insulation), and then apply weatherboarding.

b. In insulating old houses, either tack insulating board to inside of studding or cut insulating board into proper sizes and tack between studs.

c. Blanket insulation can be tacked between the studding on the inside of the house.

(3) Double walls with sawdust, shavings, straw, cork, or other material packed between, provide good insulation. The inside wall may be made of insulation board, matched or unmatched lumber or galvanized sheet iron. The loose material packed between the walls must be very dry. Lining the inside of the walls with wind-proof and water-proof paper will prevent moisture from getting into the insulating material.

VIII Brooder house design

Due to the fact that a high even temperature must be maintained, it is extremely important to have the brooder house well insulated.

This all-aluminum poultry house at the University of Illinois served as a testing laboratory. What was learned is told in the accompanying article.

How to Use Aluminum In Farm Buildings

Dos and Don'ts of applying this new building material as learned from Illinois experimental house

● An aluminum poultry house for your farm? At first thought this seems like a novel idea, but actually you can use aluminum to good advantage for siding, roofing, windows, ventilators, and feed hoppers in the laying house. And what's good for poultry house construction also may be used for other farm buildings.

Last year, the University of Illinois College of Agriculture announced a poultry laying house built largely of aluminum. It was designed mainly as a "laboratory" to study the uses of aluminum products for farm buildings. Now, after more than a year of testing, the house appears to be entirely practical for the farm. Good conditions were maintained in the house; production was high; and no disadvantages were found.

The illustration shows the house as it was built at the University of Illinois. It follows the usual recommendations for the farm-sized flock: Concrete floors, south-front windows, droppings pit, deep litter, electric lights, and overhead insulation. One 100-hen unit, or one-half of this house, is the strawloft type which many farmers like. For comparison, the other 100-hen unit was lined with insulation on sidewalls and ceiling. In both cases, aluminum sheets were applied on strips or solid sheathing in the sidewalls, and over nailing strips on the roof.

Still more important, we learned how to select and nail aluminum sheets, fit windows, and, in general, make the best use of this new farm building material. As a result of the experimental work, we have a number of answers to questions farmers ask about aluminum.

The important precautions to observe in using aluminum sheets are: (1) Build up the foundation to put the metal above the level of the litter on the floor; (2) use nailing strips spaced according to the thickness of the sheets, ranging from solid boarding up to strips spaced two feet apart; and (3) use screw-shank aluminum nails with lead heads or plastic washers, and apply them according to directions furnished by the manufacturer. You can, if you wish, use aluminum window sash, aluminum foil insulation in walls, and aluminum nests and feeders.

A complete blueprint plan showing the construction of this farm-type laying house may be obtained for 45 cents from the Department of Agricultural Engineering, University of Illinois, Urbana, Illinois.

Most of you are interested in barns, cribs, machine sheds, and garages, as well as poultry houses. Aluminum can be used for siding, roofing sheets, and windows on these buildings. If you do not care for the usual corrugated sidewall sheets, you can obtain aluminum that gives a horizontal siding effect. Some types are pre-treated to take paint; others come with a permanent factory-applied finish.

Common Questions Answered

Questions always are raised about the value of a new building material—its cost, value, faults, and practicality. Here are some of the questions often asked, and the answers based on experimental studies and observations made during the past three years.

1. *How does the cost of aluminum sheets compare with other materials that might be used?*

The cost will be more. In East Central Illinois we were quoted the following prices: For 3-in-1 asphalt shingles, $7.25 a square; 28-gauge galvanized sheets, $9.25; and aluminum .019 thickness, $11.25, and .024 thickness about $15.00. Of course, some variation in prices may be expected in different areas and at different times.

2. *What should I look for in buying aluminum sheets?*

Most sheets have 1¼-inch corrugations; you also can obtain 5-V crimp, smooth sheets. Make sure the sheets have been stored in a dry place and have not been bent, broken, or twisted. Get instruction books in order to select the right length sheets, and make sure you provide the recommended nailing and stripping or sheathing.

3. *What gauge or thickness is the most practical?*

Generally choose .019 or .024 thickness for farm buildings, as these usually are found in dealers' stocks. Industrial sheets, .030 and .032, are more expensive, but they handle well, look good, and save a great deal on sheathing.

4. *What spacing of nailing strips is necessary?*

It is often practical to use solid decking or sheathing. In any case, do not space nailing strips more than 8 inches apart for either .019 corrugated or .024 in V-crimp. You can use spacing up to 18 inches for .024 corrugated and 2 feet or more with .030 sheets.

5. *How should aluminum sheets be nailed?*

Use screw-shank or ring-shank aluminum nails with weatherproof washer. Nails 1¾ inches long are sufficient to penetrate the nailing base on new construction. Drive nails into the top of

corrugations. Drive the nails down until they fit tight, but do not dent the roofing sheet. Obtain manufacturer's instructions and space nails accordingly—usually about 100 nails to the "square" (100 square feet).

6. *Will aluminum roofing draw moisture or sweat?*

The roofing will not draw moisture, but it will condense moisture and "sweat" like any metal surface when inside air is warm and moist as compared to the outside. The remedy is to follow established recommendations for poultry and animal buildings in regard to insulation, temperature, and air circulation.

7. *Will concrete, moist earth, and manure cause aluminum to break down?*

Yes, it is necessary to keep aluminum away from contact with other material that is likely to be wet, soggy, or damp much of the time. Contact with manure will cause aluminum to break down after a time. It will not be damaged by dry concrete or ordinary wood framing, nor by the moisture conditions common to good poultry houses or barns.

8. *Will aluminum sheets creep, pull, or buckle?*

Aluminum sheets may buckle if applied on light framing that tends to sway with the wind and cause movement of the structure under the sheets. If applied as recommended, no trouble should be encountered. As to expansion and contraction, a 100-degree change of temperature causes a difference of only about ⅛-inch in a 10-foot sheet of aluminum.

9. *Will aluminum sheets pull loose from the nailheads?*

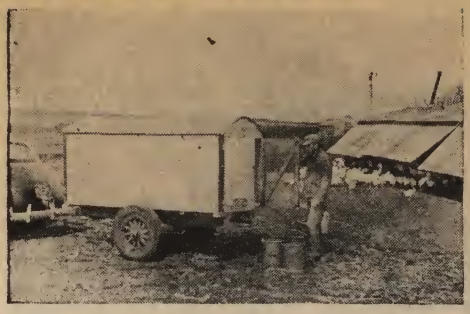
Observe four precautions to prevent sheets from pulling loose: (1) Space nails according to maker's directions; (2) use nails of recommended type; (3) drive nails carefully so as not to dent the sheet; and (4) be sure the building frame and nailing strips are substantial enough to prevent twisting or swaying.

10. *How can I be reasonably sure of getting a good, permanent job with aluminum sheets?*

Combine the foregoing suggestions to make certain of sturdy nailing base, sheets .019 or heavier, aluminum nails 1¾ inches long or longer, 100 nails to the square, and avoid contact with other metal such as steel windows, copper lightning rods, steel wire nails, or galvanized eave spouts. Then, follow manufacturer's directions for applying.

This discussion and the answers to questions are not a "sales talk" for aluminum; neither do we imply that other materials are unsuitable. Rather we have tried to give the impartial results that have come out of experimental work.

Covered Trailer for Feed

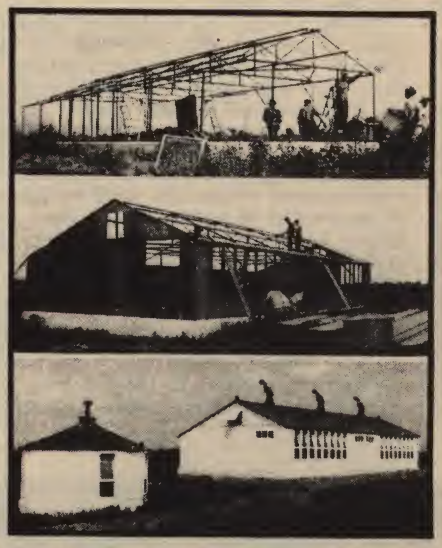


The Sternke brothers, Minn., have worked out a feeding arrangement that they find to be quite satisfactory. A covered trailer is used for hauling sacked feed from town. In addition, any grain that may be needed for their growing stock on range is put in the trailer. The trailer can then be pulled to the range and placed in a convenient spot for filling the feeders. It is waterproof and can be left there until another load of feed is needed.

Metal Buildings Used In Restoring Old Farm

Rebuilding of old buildings and erection of new ones recently were combined in the restoration of Wildebrooke Farm, in southwestern Ohio, in such a way as to suggest that the same procedure might be followed on many old farms which are to be restored to usefulness.

The dwelling house was repaired, repainted and remodeled to restore its original colonial charm, while the interior and floors of the barn were rebuilt, and new roofing and siding of paintable galvanized metal used to restore it to usefulness.



Three views showing progress in the erection of all-metal buildings on Wildebrooke Farm.

Since poultry is expected to play a prominent part in the rebuilding of the farm, two all-metal poultry buildings were erected. One was a brooder house, 12 ft., 4 in., in diameter, on a permanent concrete foundation, and the other a Missouri-type metal laying house, 20 ft. wide and 48 ft. long, with a concrete block foundation.

Although both buildings are made of galvanized sheet metal, they were painted immediately. A special bonderized surface, applied in the steel mill, makes acid-etching or weathering of the metal unnecessary before painting.

Provide Chick Roosts Early

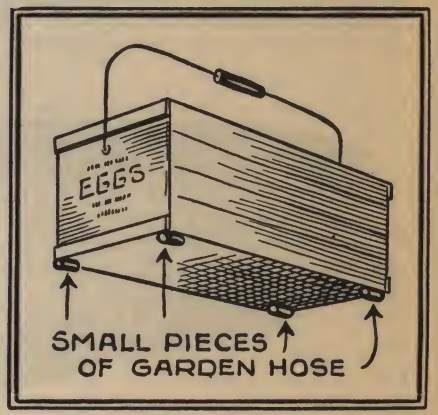
Providing roosts for the chicks after the first three or four weeks of brooding will make it possible to discontinue heat much earlier without the danger of crowding and piling. If properly constructed, the chicks soon learn to use them and less trouble from non-roosting will be had throughout the life of the birds.

A roosting frame made out of 2' x 2' lumber with 1' x 2' strips for perches, spaced about eight inches apart, and with 1 inch poultry netting or welded wire fabric, 1 x 2 inch mesh, 14 gauge, nailed on the underside of the perches, to keep the chicks out of the droppings, makes a satisfactory chick rooost. Such frames can be placed against the rear wall of the brooder house and sloped from the wall to the floor; the size frame depending on the number of chicks and the size of the house. The frame should not be placed at too steep an angle, as the chicks will take to it much quicker if it is relatively flat.

The chick roost frame shown here is 4' x 10' against the rear wall of a 10 x 12 brooder house. It is 10 inches high at the rear wall. Later, a 10 inch board can be placed on edge at the front of the frame making a flat dropping pit. *(P.T. Farm Photo)*

A Handy Help!

Egg Case Cushion



Farmers who haul their eggs over rough roads can save breakage by cushioning their egg cases with a small piece of garden hose toenailed on each corner as shown in illustration.—*Wanda R. Lowmiller, Pa.*

Remodeling Old Poultry Houses

For Those Who Cannot Build New Houses, Here Are Some Suggestions For Making Present Buildings More Satisfactory

ONE of the most important factors influencing production is that of housing. Birds which are comfortably housed are much more apt to continue in heavy production when winter strikes its blows than are birds in poorly built and equipped houses. To a certain extent, the same is true at other seasons of the year.

Since it will not be possible in all cases to build a new house, poultrymen in such circumstances should consider remodeling and repairing their present buildings. In many instances, it will be possible to turn a house which is unsatisfactory at present into a desirable laying house without a great deal of expense.

Go into your poultry house and look it over with a critical eye. Is it dry, well ventilated, light, and is it warmer inside than the outside temperature during winter?

The first place to check, of course, is the floor. Since it is practically impossible to make a satisfactory dirt floor, a permanent floor of some kind should be put in the building. The most satisfactory floor is a concrete floor laid on about 8 inches of gravel, which has been covered with a water proof paper and the concrete laid over the paper. If for some reason concrete cannot be used and a wooden floor is built, it probably would be advisable to insulate the floor, especially if it is very high off of the ground, for a great deal of cold air can come through a single layer of flooring.

Next, examine the walls. Are they tight, or are there cracks and holes through which wind can blow in winter, causing drafts and resulting in colds and roup in the flock? There are several ways of repairing bad walls. They may be covered with roofing paper and battens. This does not make a very nice appearing house, however, and is not as warm as some other methods.

Perhaps the best plan is to line the walls and ceiling with an insulating material. A good insulation board is equal in insulating value to about two equal thicknesses of lumber with paper between them. In some instances, it might be preferable to put the insulation board over the outside of the present siding, although it usually is best to put the insulation on the inside of the walls. In that case, the insulation should be sized and kept well painted to preserve it. Covering the inside wall with a wind and water proof paper and then placing the insulation over the paper makes a very excellent construction.

In any case, make sure that all cracks and holes in the wall are closed by some means.

In most old poultry houses, the ceiling is too high. Ceilings do not need to be any higher than necessary to allow the caretaker to get about comfortably. If the ceiling in your house is more than seven feet above the floor, it probably would be advisable to put in a new ceiling. Here again the structural insulation board will make the warmest and best job. It is important to have a tight ceiling, for warm air naturally rises, and will escape at the ceiling if it can, leaving the house colder than necessary.

Some people, of course, use straw lofts which do help to keep the house warmer in winter and cooler in summer, but they are not generally considered as satisfactory in that respect as insulation, and have the further disadvantages of being dirty and of harboring rats and mice.

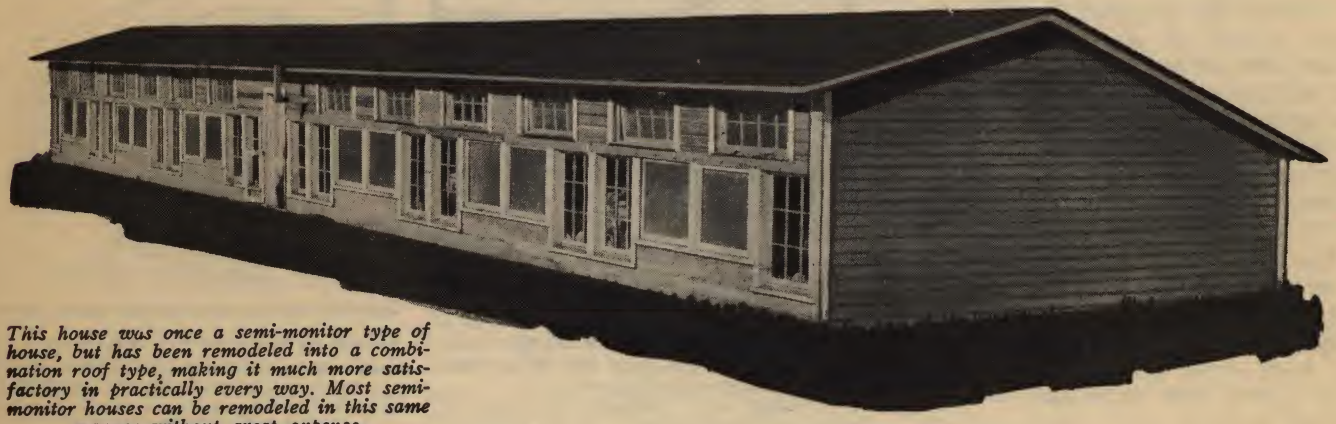
There should be sufficient window space to provide plenty of light in the house. A general recommendation is about one square foot of window space to 15 square feet of floor space. There is some tendency to recommend less window space than this, especially in wide buildings which have windows on two or more sides. In such buildings it frequently is recommended that one square foot of window space to each 30 to 40 sq. ft. of floor space will be satisfactory.

One type of window which is frequently recommended has the top sash hinged at the bottom, so it tilts in at the top. This can provide ventilation during all kinds of weather, or be closed entirely. When glass substitute is used in the windows, the frames frequently are hinged at the top in order that the windows may be hooked up against the ceiling out of the direct rays of the sun during the summer.

When it is desirable to make more windows in a poultry house, or in a building being remodeled for a poultry house, such as an old barn, there are several relatively new types of windows which should be considered for this purpose. One of these has a metal frame which can be set right into an opening cut through the siding and takes only a few minutes to install.

A problem which must be given consideration in connection with practically all remodeling is that of ventilation. Temperature control and dryness in a poultry house both are tied up quite closely with ventilation. Fresh air must be taken in through special openings, or windows, in a manner to avoid direct drafts on the birds. Since in a well constructed house the inside temperature is higher than the outside, the air will be warmer and will absorb moisture. The air also rises as it becomes warmer and carries the moisture out with it if it finds an outlet from the house. If there is no outlet, however, the warm moist air may become trapped next to the ceiling where it cools and the moisture condenses on the ceiling and walls as water or frost. This, in turn, drops back into the litter and soon the house is wringing wet. Ventilator outlets may be placed with the outlet opening even with the ceiling, in which case they must be partially closed during winter to prevent the too rapid escape of warm air, or the outlet may be a flue extending down to within about two feet of the floor. Either works satisfactorily if properly built. The outlet flue should be tight and insulated.

The interior equipment should be remodeled with the house. Unless they are already present, droppings boards and roosts should be placed along the back walls, allowing about seven inches of roosting space per bird for Leghorns, 10 inches per bird for Plymouth Rocks and other breeds of that size, with more space in proportion for larger birds.



This house was once a semi-monitor type of house, but has been remodeled into a combination roof type, making it much more satisfactory in practically every way. Most semi-monitor houses can be remodeled in this same manner without great expense.

Place the roosts from 14 to 16 inches apart, depending upon the size of the birds, with the outer roosts about 12 inches from the edge of the droppings boards. Roosts should be six to eight inches above the droppings boards, which, in turn, should be about 30 inches above the floor. Under the roosts, but over the roost support, one and one-half inch mesh, 16 gauge, wire netting should be nailed to prevent the birds from walking on the droppings and picking them up. Use 2 x 2 inch material with the upper corners rounded for roosts.

If preferred, droppings pits can be installed as described on another page in this book.

There should be one nest for every seven hens. When trapnests are used, one nest should be supplied for every four birds. For birds of one of the smaller breeds, nests 11 by 12 inches are about right, while birds of a heavier breed require a slightly larger nest.

Ample hopper space must be provided. One running foot of hopper space for each 10 birds, provided they can eat from both sides of the hopper, is about right. In determining the amount of fountain space, it is generally figured that 100 birds in good production will drink at least five gallons of water daily.

Plans for nests, feed hoppers, and other equipment will be found in the last part of this book. Many poultrymen, however, prefer to buy metal nests, fountains and feeders, due to their various advantages.

Good Roof Is a Necessity

This entire house now must be protected with a good roof, for without a weather-proof roof the rest of the house will soon go to pieces. In building a new house, or putting on a new roof, a composition paper is the most popular roof. This can be used either as a single layer, or as several layers, making a built-up roof. When the slope is fairly steep and an attractive appearance is desirable, composition shingles will meet all requirements as they can be obtained in a variety of designs and colors. Metal roofs also are satisfactory, especially if the ceiling is insulated.

In repairing an old roof, it should be gone over carefully and all loose nails driven tight, or taken out and the hole filled in with a plastic cement. Larger holes can be patched by covering the area around it with plastic cement and pasting, then nailing a piece of roll roofing over it. Examine all the angles where the chimneys or ventilators and roof meet and note all cracks and shrinkages which should be filled with the same type of plastic cement.

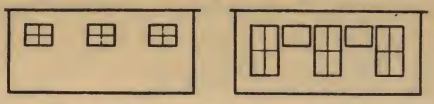
After all of the holes have been patched with cement or a piece of roofing, the entire roof should be covered with a good roof coating. The roof then will be in condition to withstand all ravages of winter and will keep the rest of the house protected.

If you happen to have a semi-monitor type of poultry house which was widely recommended several years ago, we believe that it would be especially desirable to remodel it by making the front wall slightly higher and extending the roof on the front part up to the highest point of the roof at the back, making the house into a combination roof style. The semi-monitor type house is almost impossible to ventilate properly, which is the main reason for remodeling it. A false ceiling can be put in at a seven foot height, to make the house warmer.

How to Remodel!

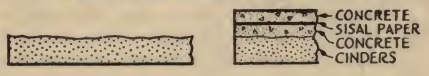
There are four basic poultry house remodeling problems. On slack days, without hiring any additional help, your poultry house can be modernized at small expense. This is how to do it.

DARK HOUSE



There should be 1 square foot of window opening to each 10 to 15 square feet of floor space. Use a glass substitute to admit the ultra-violet rays. Make the windows the width of the glass substitute and deep enough to cover the whole floor with sunshine.

DAMP, INSANITARY FLOORS

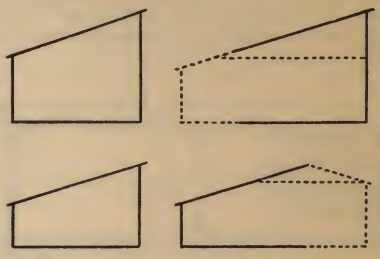


Dirt floors are damp, insanitary, hard to clean. It is easy to put in a concrete floor. Take out enough dirt to make room for an 8 to 10-inch fill of coarse gravel or cinders. Put 2 inches of concrete over this fill. Then seal this with a layer of sisal paper over the concrete. Tar the joints. Put 2 inches of concrete on top of the paper, and you will have no trouble in the future with floor moisture coming from below.

HIGH CEILING

Houses with high ceilings are hard to keep warm. Put 2 by 4's across at the 7-foot level and make a false ceiling of insulation board. Insulate the side walls too.

NARROW HOUSES



The recommended width for poultry houses is 20 to 24 feet. A high 16-foot house may be brought up to date by adding 4 or 8 feet at the rear. The narrow low house is modernized by adding at the front. This makes it a combination roof house. Put in a false ceiling, otherwise it will be cold . . . and insulate the side walls.

Special Types of Houses

Poultry raisers frequently ask for plans for houses for specific purposes, such as a long continuous brooder house, battery brooder room, hatchery building, and similar structures.

In practically every instance, however, these are of such a specialized nature that plans need to be drawn to fit each individual circumstance, and it is practically impossible to draw up standard plans which will fit all requests.

Usually the most satisfactory source of plans of this nature is the manufacturer whose equipment is to be used in the building. For example, in a hatchery, the manufacturer of the incubators which are to be used usually is in the best position to suggest a good type of building. The same is true of manufacturers of brooding systems.

While we do not attempt to provide plans for these specialized buildings, we shall be glad to put any poultry raiser in touch with companies who can give advice concerning such buildings. Address your request to Service Department, *Poultry Tribune*, Mount Morris, Ill.

Note on Sheet Steel

The most commonly recommended sheet steel for roofing and siding, as suggested with the various bills of materials is 26 gauge 1½" corrugated Seal of Quality galvanized. There also are other types in addition to the corrugated which can be used.

In specifying the amount required for each house, allowance has been made for side and end laps. It would be well to check with the contractor as to the quantity required, however, especially if another type of metal is used.

Chickens Take Over Barns

"The chickens are in the barn."

With this comment, more and more farmers head toward the barn with visitors interested in seeing their poultry. Sometimes the whole barn has been remodeled to accommodate chickens, while in other instances they may occupy only one floor, or even a section of one floor.

This third floor of a barn is in the process of being remodeled for poultry. Note that a ceiling was put in at the height of 7 feet and insulation board used to cover both the ceiling and walls. On the walls the insulation was fitted tightly between the studding in order that it would not leave any space for rats. Waterproof building paper was used between the insulation and siding. The dropping pit is at the right.

It is a relatively simple matter to remodel a barn to make it satisfactory for poultry. In the first place, the walls need to be made tight in order to avoid drafts and to keep the birds more comfortable in both winter and summer. More windows for light and ventilation than are found in the usual barn, and some method of ventilation, also are necessary.

Instead of putting in roosts and dropping boards, more farmers now use dropping pits in remodeled buildings, because of their saving in labor.

Handy Poultry Equipment

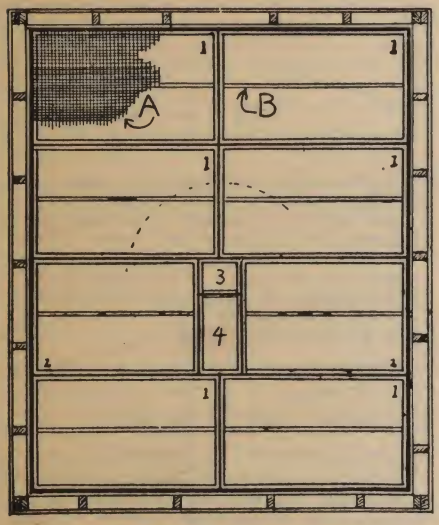
A GOOD poultry house is not complete without good equipment. On this and the following page, there are several items of equipment which any one who is reasonably handy with tools can make for himself. Complete bills of material and instructions are not included for each item, as we believe that the drawings and photos are sufficiently clear that additional explanations are unnecessary.

The low feeder shown on the next page is one recommended by the Ohio Agricultural Experiment Station for use with dropping pits, although such feeders also can be used in other houses.

The tunnel nests also are recommended by the Ohio Station. They may be made 4 to 12 feet long, and have no partitions. The nests may be made with 1x4 inch *(See next page)*

How to Make a Wire Floor

Wire floors built according to the plans shown below help prevent diseases by keeping the chicks up where they cannot pick at droppings or other filth.



Plan for Screening a 10x12 Brooder House

1. Floor frames about 3'x5' with center support B to prevent wire from sagging.
2. Frames about 3'x4½'.
3. Frames about 1'x1' for supporting stove. The exact size to be according to dimensions of the base of stove. Since the stove sets on this it need not be screened.
4. Frame about 1'x2' to fill in the space just back of the stove.

All frames made of 1"x6" boards placed edgewise and covered with ½ inch square mesh hardware cloth. The center supports may be made of 1'x4' pieces if desired.

This plan is for a house with a 10' front and 12' from front to rear. If the house has a 12' front and is 10' front to rear the same plan is used except that the frames are about 2'-6" wide and about 1' longer and placed endwise from front to rear instead of from side to side.

The frames are strong enough for the attendant to walk on them, and feeders, fountains, and stove may be set right on the wire, eliminating litter and dirt that ordinarily gets into these vessels.

In building floors for other houses as many frames as possible should be made the same size so that they may be interchanged. It is best to make the frames not less than six inches high, as the wire is almost certain to sag somewhat.

The accompanying plans for a wire floor were devised by the Ohio Agricultural Experiment Station.

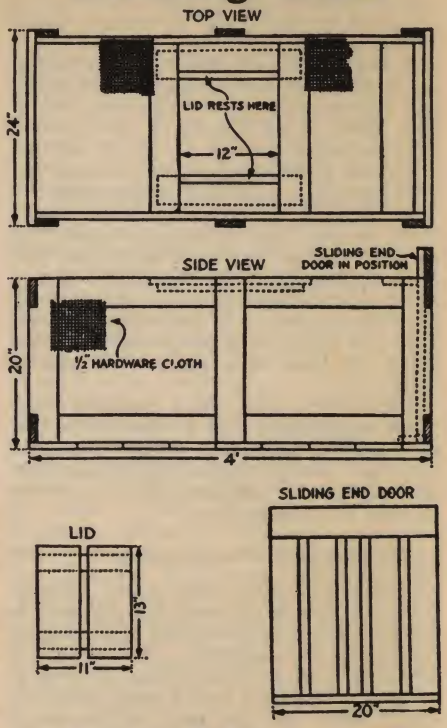
Although the system of raising baby chicks on wire floors is widely advocated, there is some confusion as to the proper gauges and meshes of hardware cloth to be used. It seems to be quite generally agreed, however, that the two mesh (or one-half inch mesh) is best adapted for baby chicks, and that the three-fourths inch mesh is best adapted for broilers and mature birds.

The 17 gauge is recommended when the one-half inch mesh hardware cloth is used. When the three-quarter inch mesh is used, it should be 15 gauge.

Ready built wire floor sections have been put on the market by a manufacturer of wire products. These can be secured in sections three feet square, or they can be ordered in any size to fit a special house.

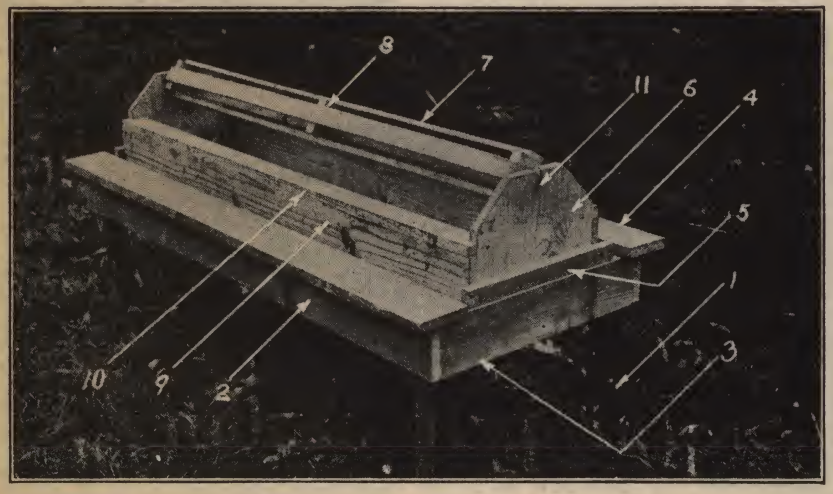
Welded wire fabric and a special expanded steel floor material also are very satisfactory for floors in brooder houses and sun porches, especially for older chicks.

Catching Crate



One of the handiest pieces of equipment on a poultry farm is a culling crate. In addition to its use in catching hens for culling, this crate can be used in catching broilers and pullets in the brooder house. Pullets can be driven from range shelters into it for vaccinating, worming or moving, and birds of all ages may be caught in it for transportation from one location to another.

THE OHIO REEL MASH FEEDER



DETAILS AND BILL OF MATERIAL

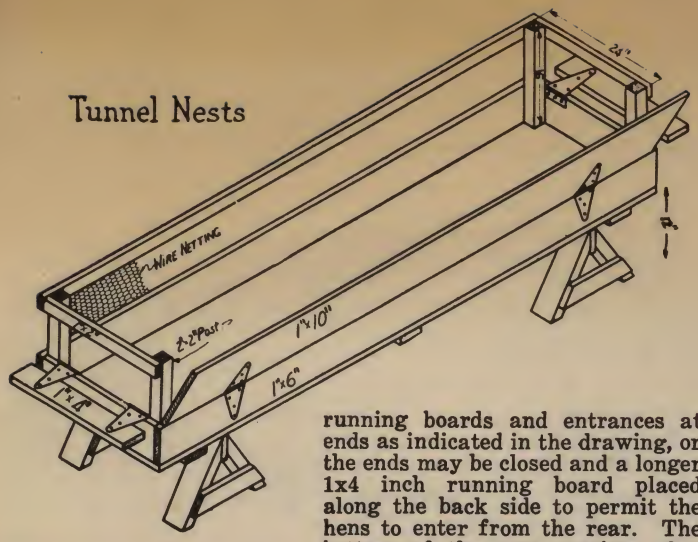
STAND:

1. **Legs:** 4 pc. 2x2x16 inches; or the frame may be suspended the proper height by four wires from ceiling.
2. Sides of stand: 2 pc. 1x4 in. 4 ft. 2 in. long.
3. Ends of stand: 2 pcs. 1x4 in. 20 in. long.
4. Running boards: 2 pc. 1x4 in. 4 ft. 2 in. long.

MASH BOX:

5. Cleats: 2 pc. 1x1 in. 16 in. long, nailed across ends of box 2½ inches above bottom.
6. Ends of box: 2 pc. 1x12 in. 10 in. long with corners removed. The ends set on bottom of box. Bottom of box: 1 pc. 1x12 in. 4 ft. long, extending under the ends.
7. Reel: 4 plaster lath 4 ft. long.
8. Reel: 3 square blocks 1x3x3 in. for ends, and center of reel to which the lath are nailed.
9. Sides of box: 2 pc. 1x6 in. 4 ft. long, nailed on outside of bottom.
10. Lip boards: 2 pc. 1x2 in. 4 ft. long, nailed on top of sides and extending about 1¼ inches inside.
11. Axes of reel: 2 No. 10 flat headed screws 2½ inches long. One pound 6 penny box nails.—*Courtesy Ohio Experiment Station.*

Tunnel Nests



running boards and entrances at ends as indicated in the drawing, or the ends may be closed and a longer 1x4 inch running board placed along the back side to permit the hens to enter from the rear. The bottom of the nest consists of a separate unit of two 1x12 inch boards cleated together and removable when the nests are cleaned. The top of the nest is the same as the bottom so that it may serve either for the top of a bottom section or the bottom of an upper section. The hens are kept off the top of the nests by wire netting. The bottom section may be supported 12 to 16 inches above the floor, or it may be placed on the floor, especially for the heavy breeds of chickens.

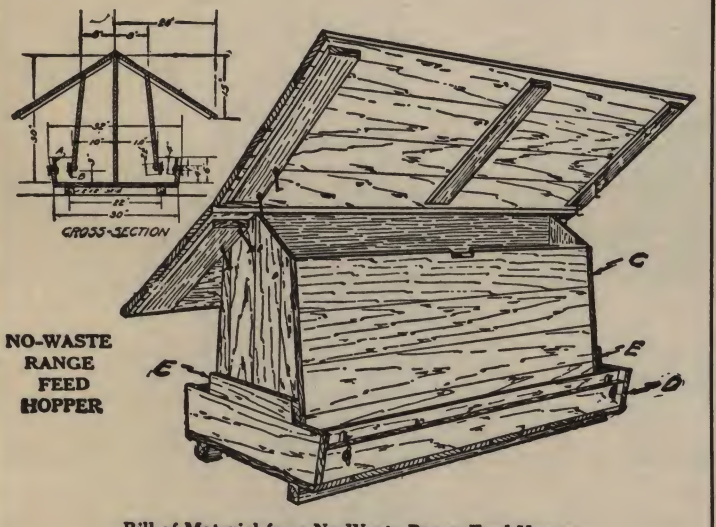
In order that there will be ample ventilation, especially during warm weather, it is necessary to place the nests 8 to 12 inches away from the wall or partition. When the hens enter or leave from the ends, as shown in the drawing, the open space in the rear may be enclosed with wire netting to prevent the hens from roosting on the rear side board. In either case the running board is hinged so the hens can be shut out of the nests when desirable.

A box tunnel nest 8 feet long will accommodate 100 layers, and two tiers of the same length will serve for 200. Another advantage is that the interior of the nest is darkened to prevent the hens from disturbing each other and to prevent egg eating, breakage of eggs, and soiled eggs. The nesting material may consist of 3 to 4 inches of shavings, sawdust, oat hulls, or other suitable nesting material. Straw is not satisfactory.

Many poultrymen, of course, prefer to use metal equipment, which has a number of advantages and which can be obtained in a variety of sizes and designs. This is especially true of chick equipment, which usually costs so little that it does not pay to attempt to make it.

Low feeder for houses with dropping pits. *(see page 19)*

This range waterer consists simply of a buttermilk barrel with an automatic valve in the bottom, which keeps the trough full of water, yet does not waste it. Putting the trough on a wire platform aids in preventing disease.



Bill of Material for a No-Waste Range Feed Hopper

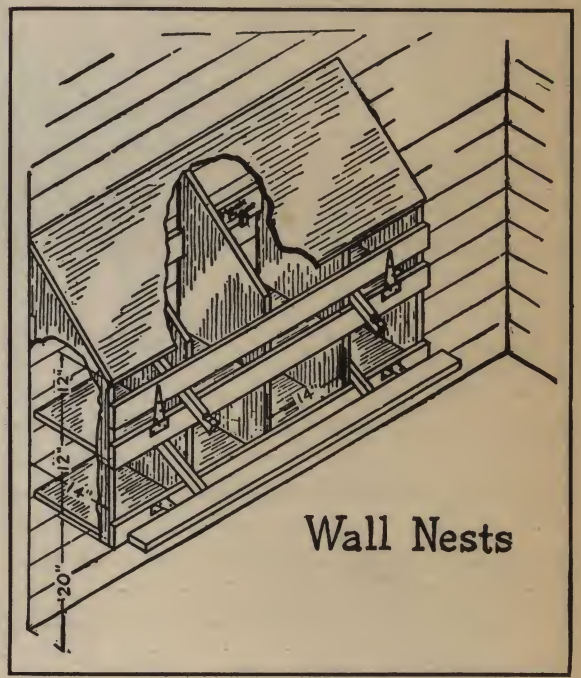
Lumber

Lumber for floor, box and cover—140 bd. ft.
1"x6" matched material
End of box—1-1x6-6'
Skids—1-2x2-10'
Slide adjustment—2-½"x2½"-5'-0"
—2½"x4"-5'-0"
Side boards—2-1"x4"5'-0"
End cleats—1-1"x3"x4'-0"
Cleats for cover—1-1"x4"x15'-0"

Hardware

5 lb. No. 10d Nails
2 6" strap hinges with screws
8 ⅝"x2" carriage bolts with washers and thumb nuts
8 4" galv. iron hooks with hook eyes

(Courtesy Mass. Exp. Station)



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